THE RAILWAY REVIEW

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WATER TUBE BOILERS AND GREASE.—Grease in marine boilers of the Scotch type is the terror of engineers, and as one of them recently said to us: "We are almost afraid to open a furnace door for fear that one of the furnaces may come down on us." This is by no means a matter of fancy, or an unreasonable fear, for there seems to be no way of keeping Scotch boilers absolutely free of grease so long as any is used in the cylinders. Some engineers merely swab the piston rods occasionally, never putting any free oil into the cylinders, but even with this, good filter boxes, and careful attention to them, the condensers become foul and the boilers are greased. A very small quantity of it is fatal to the furnaces, and the fact that the grease cannot be discovered, or any traces of it, in the event of disaster, lends additional uneasiness to the subject. It occurs to us that we have not yet heard of any disasters to water tube boilers from this cause. We do not know of any sagged tubes from the presence of grease. Tubes have sagged over the fire from various causes, possibly defective circulation, possibly from the water being driven out by hard firing, but no cases which could be actually attributed to oil in the tubes have been reported to us. This immunity from disaster may occur from the rapidity of the circulation and from the presence of more or less sediment or deposit which may exert a scouring action; whatever the cause, water tube boilers do not seem to be as liable to injury from grease as Scotch boilers. And yet grease must get into water tube boilers as well as other types, for all are fed from the same source where surface condensers are used.—Engineer.

PNEUMATIC TIRES.—In the June Bulletin of the Society of Civil Engineers of France an exhaustive account is given of some tests made to determine the efficiency of pneumatic tires contributing to the ease and comfort of a vehicle. With the usual French thoroughness he describes the earliest pneumatic tires, and reprints descriptions of them published is 1846. His own experiments were made with the pneumatic tire and the ordinary wheel, and there were five series in all. The first v as made on three days, when the ground was covered with 2 in. of snow, when the same was melting and when the ground was muddy. The results obtained showed that with the empty carriage moving at a walk through the snow the draft was 35.9 lbs. with the iron wheel, and but 25.2 lbs. with the pneumatic tire. At a trot, with a load of 660 lbs., the pull was 68.6 lbs. and 39.5 lbs. respectively. In the mud, under the same condition of load and speed, the pulls were 35.2 and 50.7 lbs. for the iron wheel, and 23.1 and 31.2 lbs. for the pneumatic tire. The other tests consisted of pulls of varying speeds over macadam, paved and ordinary roads, and in every instance the pneumatic tire showed a saving in pulling power of from 30 to nearly 50 per cent. As to comfort, the well known silence of the pneumatic tire is enlarged upon; also careful measurements were made to show the difference in the vibrations caused by the two types of tires, and in this the advantages of the pneumatic tire were clearly shown. Its springy action is demonstrated by the fact that when it is made to pass over three obstacles there is a wavy motion given to the diagram, and that if two of the three are removed the same wavy effect remains. Hence the elasticity of the pneumatic tire is proven by the rhythmic vibrations that it produces. But the main feature of interest in matter lies in the fact that the actual amount of power required to pull a carriage equipped with pneumatic tires is very much less than it is when ordinary wheels are used.

EFFECT OF FAULTY COUNTERBALANCING.—The bending of rails in the track by locomotives with faulty counterbalancing has recently been discovered on the Louisville & Nashville Railroad. The rails were bent sidewise and not vertically, as is usually the case when the counterbalance is too heavy, and there seemed to be no bending action produced by the driving wheels until the speed was over 48 miles an hour. The bends were first produced on one side and then at the other, evidently by alternate blows from the sides of driving wheels. It was found that the main driving wheels were about 600 lbs. short of the correct weight for counterbalance, and this weight was distributed between the back and front wheels of the engine. This caused an oscillating motion, and the driving wheels rocked from side to side. By using lead, the proper weight was put into the main driving wheels, and the extra weight was taken out of the other wheels. This resulted in stopping the evil effect upon the track.—[Engineering News.

SEPTEMBER TRACK WORK.—Trackmen should bear in mind that September is the best month in the year in which to raise track. The ballast is dry and seems to hold the track better than at any other season, while the days, though still warm, are not oppressive. Nothing but a peremptory order from the roadmaster should induce a foreman to stop surfacing track this month if his section needs it. Not a day should be missed, nor even an hour's work. Let everything go for a while; quit running up and down the section on the hand car; stop patching and tinkering of all kind, and raise track. See that your plans are so arranged that the movement of trains will cause no setback. Raise as many rails as possible between regular trains, tamping only ends of all ties excepting joint ties, which should be tamped clear across. Then, after a train has passed, tamp centers. With dirt in good condition as it is now, track so tamped will not settle much, and the advantages are that such track is not liable to become center bound, and that if a train happens to be late the time, usually more or less wasted until it passes, may be spent tamping centers. The writer believes that better track may be obtained by following this plan than if ties are tamped inside and outside at the same time, and certainly more may be accomplished than if a foreman only raised what could be completely tamped before a train is due on account of the frequency with which trains are behind time. Every foreman should personally tamp all joint ties, and then he will know that the most important part of the work is done right. A large percentage of ordinary track laborers do not make any special effort to tamp more dirt under a large tie than a small one. They make about the same motions and passes at each tie, be it big or little, and as joint ties are generally selected for their width, it follows that extra care should be exercised to pack the dirt so that no open space will be left under the center of the tie. By having four men tamp center together the track will settle more evenly than if two men only worked together and each tamped alternate rails. Nor should different sorts of men tamping centers be allowed to work far apart, because if one rail is tamped inside and outside and another only tamped outside, the latter will in course of time settle more than the former, thus spoiling what otherwise might be good track.—[Jerry Sullivan.

TRAFFIC VIA THE "SOO" CANAL.—Comparative statement of commerce east and west bound through St. Mary's Falls canal, Michigan, for month of August, 1896:

EAST BOUND.

Items.	Designation.	U. S. Canal	Can. Canal	Total.
Copper	Net tons	15,066	914	15,980
Grain	Bushels	2,159,592	1,149,532	3,309,124
Building stone	Net tons	3,578		3,578
Flour	Barrels	1,063,306	217,276	1,280,582
Iron ore	Net tons	1,065,955	288,919	1,354,874
Iron, pig	Net tons	1,531	2,220	3,751
Lumber	M. ft. B. M.	98,231	3,145	101,376
Silver ore	Net tons	140		140
Wheat	Bushels	5,060,272	1,734,922	6,795,194
Unclass'd frt	Net tons	27,137	2,402	29,539
Passengers	Number	4,668	2,062	6,730

WEST BOUND.

Items.	Designation.	U. S. Canal	Can. Canal	Total.
Coal (hard)	Net tons	33,637	14,950	48,587
Coal (soft)	Net tons	286,821	138,454	425,275
Flour	Barrels			
Grain	Bushels			
Manuf'd iron	Net tons	10,647	114	10,761
Salt	Barrels	16,230	1,175	17,405
Unclass'd frt	Net tons	36,324	10,506	46,830
Passengers	Number	4,002	3,126	7,128

East bound freight, net tons	1,978,922
West bound freight, net tons	533,913
Total	2,512,835
Total craft—United States	2,103
Total craft—Canadian	748
	2,851
Total registered tonnage—United States	2,082,742
Total registered tonnage—Canadian	579,761
	2,662,503

NEW STYLE OF TRAIN SERVICE.—The porter has disappeared from Chicago & Alton trains, after having made himself generally useful for many years. In his place is found the gateman, whose duty it is not only to perform the work heretofore done by the colored gentleman and the brakeman, but to open and shut the gates with which nearly all Alton passenger car platforms are now equipped. The passing of the porter has worked a number of changes in the Alton forces. Heretofore there was a brakeman to each two cars and two to the last one, one of them serving as a watchman, under strict instructions never to leave the rear platform. Under the gateman system, all brakemen, save this watcher on the rear platform, are done away with. It is stated at headquarters, however, the change is not throwing any men out of work, as former porters and brakemen are being given the positions of gatemen. The new plan removes several sources of danger in the Alton service. Passengers are not able to leave the platforms while a train is in motion, nor is any one able to jump on after a train starts. The scheme is to be adopted on all the trains of this company.

WOOD PRESERVATION.—In reviewing the various processes and means of impregnating wood, in order to its preservation, a writer in the Technical Review of Natural Science, Jena, Germany, considers the carbolineum avenarias to posses special merits, offering in its use the important desideratum of requiring no machinery or apparatus, but simply a brush for painting or an iron tank for immersing the woodwork to be treated. The use of this article is based upon the essential fact that a good system of impregnation must efficiently prevent every degree of the rotting and decaying of wood, even in unfavorable conditions; it must also be so cheap that no obstacle of this kind exists to its use in great quantities—must be easily employed and furnished ready for use—another desirable point being that the impregnation be such as will give an attractive color to the treated woodwork. These qualities are combined in the substance in question, it being a carbonate of oil of 1.14 specific gravity, and components which are energetically antiseptic, its boiling point being 557 deg. Fahr. Impermeable coatings, so much resorted to, are pronounced of little value, when the wood at the time of their application is not perfectly dry and seasoned—they prevent, as must naturally be the case, the evaporation of the humidity contained in the wood, especially in certain cases, and rather promote decay.

MANCHESTER SHIP CANAL.—The report of the directors and statement of accounts for the half year ended June 30, submitted to the shareholders of the Manchester Ship Canal Company at the meeting held on Tuesday last, were issued a few days ago. The directors state that the expenditure on capital account during the half year, after deducting proceeds of sales of land and plant, was £52,757, making a total expenditure out of capital of £15,154,203, and leaving a balance on that account of £250,132. The report proceeds: The receipts on ship canal revenue account amounted to £81,214, and the expenditure, including £36,701 for dredging and other maintenance, and £1,972 for exceptionally heavy law expenses, to £88,643, leaving a debit balance of $7,429. The profits of the Bridgewater undertaking amounted to £22,566, leaving a balance of £15,137 carried to net revenue account, to which are added bank interest and surplus of realization of cash invested in consols, amounting to £7,936, making a total credit on net revenue account of £23,073. The debit balance on net revenue account brought forward from last half year was £79,212, which is increased by the addition of interest on mortgage debentures for the half year, viz., £157,242. The total debit balance at the date of the account amounted to £213,382, but as the corporation of Manchester has allowed its interest to remain in arrear, there was an available balance of £67,868. Interest for the half year on the first and second mortgage debentures, amounting to £44,742, has been paid, but the interest payable to the Manchester corporation, amounting to £112,500, remains in arrear, in addition to the interest due at the close of the previous half year, viz., £168,750, making a total amount due, but not paid, to the corporation of £281,250. The gross receipts from the ship canal undertaking amounted to £81,214, an increase as compared with the corresponding six months of the previous year of £18,177.

ELECTRICITY ON THE MANHATTAN ELEVATED RAILWAY.—The Manhattan Railway Co., of New York City is building an electric locomotive which it proposes to run experimentally on the branch of the elevated railway system extending from the Long Island City ferry through Thirty-fourth street to Third avenue. The engine, which is being built at the company's machine shops, at Ninety-eighth street and Third avenue, will be equipped with the system of the Electric Storage Battery Co. It is of the same size as the steam locomotive now used. Its battery will be replenished from a third rail which will be constantly charged with electricity by the New York Electrical Equipment Co., whose plant at 572 First avenue has been connected with the elevated railroad spur in East Thirty-fourth street. The battery is a stationary and permanent part of the locomotive and is not removed for charging. It can be charged direct from a third rail, from which the electricity is taken by means of a contact shoe which may be let down or taken up at will. When the battery, or electrical reservoir, is charged, it will contain a reserve force sufficient to run a train of cars from fifteen to twenty miles without recourse to the third rail. Two of the elevated railroad passenger cars have been equipped with incandescent lights and electric heaters, to be supplied by the locomotive. The company is also about to experiment with an air motor, similar to that now being tried by the Third Avenue Railroad. The engine is being built at Rome, N. Y., by the American Air Power Co.

STEEL-MAKING IN SWEDEN.—Desirous of showing why American steel is not by our tube makers regarded with as much favor as the stock imported from Sweden, the head of an establishment which draws tubing for use in bicycles recently stated to a press representative that American manufacturers, while possessed of the ability to turn out open-hearth stock which is without a superior, yet for some reason or other have not been able to get that quality in their raw stock which is found in the tubing drawn from imported billets. In the Swedish billets the metal is homogeneous in character, the molecules lie closely together, and of necessity the tubes drawn from it are singularly free from imperfections. The Swedish mines are operated in a very remarkable fashion by an organization which deliberately limits the supply to the various countries. It is a fact that the product of the Swedish mines for the next four years has been sold and only a fixed quantity of stock can possibly be delivered to each of the nations which make use of it. It is of no use to beg for more, for more cannot be had under the present method of operation. The mines from which the prized Swedish steel is obtained are located in a mountainous region which is well nigh inaccessible. No railways connect the mines with shipping points; the product is hauled by animals. The owners of the mines are not impregnated with modern notions of progress and steadfastly refuse to accept any suggestions for increasing their business. The laborers are under contract for a number of years, and owing to the sequestered situation of the mines the place has become a community remote and apart from the rest of the country. Smelting of the ores used in the making of the famed Swedish billets is accomplished by the use of charcoal, which has recently increased 50 per cent in value, and which, as a natural result, has caused a raise in the price of the manufactured steel. This process of smelting, while expensive, has nevertheless the distinctive value of not harming the silicon, carbon and other substances contained in the ore. Another cause for the advance in price of Swedish steel is found in the scarcity of mining ma-

chinery there, the most primitive and costly methods being used for obtaining the ore from the earth and bringing it into the condition of steel.

FOURTEENTH ANNUAL CONVENTION OF THE ROADMASTERS' ASSOCIATION OF AMERICA.

The fourteenth annual convention of the Roadmasters' Association of America was called to order in the parlors of the Cataract House at Niagara Falls on Tuesday morning, September 8, at 10.30 a. m. In opening the convention President C. E. Jones addressed the members as follows:

PRESIDENT'S ADDRESS.

There are to-day 180,000 miles of railroad in the United States, two-fifths of all the tracks in the world, and this immense amount of railroad is the foundation of this association. And why is it that we have an association of roadmasters? It is that by the exchange of thought and experience we will be better able to take care of the track under our care. This is the age of associations. Nearly all the different branches of the world's business men, and those holding official positions in the different walks of life, are forming themselves into associations that meet once a year or oftener to discuss the ways and means to arrive at a better knowledge of their calling. And while men should know well their business in all its parts, we of all that vast army of them who toil for a living, should know well how to build and maintain the track that carries the rapidly moving trains with their happy passengers.

Yes, indeed, we should understand our business thoroughly to be able to instruct our trackmen under us. Not only able to instruct in theory but be able to take hold of the work in person, especially in time of wrecks, washouts or anything that obstructs the moving of the wheels. Our watchword should be "Never Sleep" For you know well that to insure the safety of the trains the trackmen must and always are expected to be ready to go over their track, and no matter how hard the storms, and they as a class are trusty. Yes, I will say that I believe no soldier or picket post in time of war is more to be trusted than the humble section men, and how little the passengers asleep in the Pullman car think of him that is responsible for the safety of the track.

We often hear of the brave and faithful engineer, but nothing is said of the trackman. His part needs no praise but his faithfulness is shown by the many millions of passengers carried safely over rivers and mountains. And we roadmasters always encourage and ass st him to the extent of our ability.

We who represent the foundation of all railroads—the track—have met here at the Fourteenth Annual Convention of the Roadmasters' Association of America, to discuss the reports of committees on the several subjects appointed for our consideration, and I for one, think we should take a step farther than we have done in the past, and that we should say what, in our judgment, is right in regard to the way and means of handling track, and not wait for other associations to decide for us. We should do this if we are what our name implies—master of the track—and it means that we understand our business and should say what we know from experience to be right. We should so study our track in all its different parts that we thoroughly understand the ways and means of putting our track in its every condition, so that if required, the trains can go safely even at sixty, or more miles, per hour. But to do this with the increased tonnage of cars and engines, we need heavier rails, a better joint, and the best of ballast. This with the high class of work we are now performing insures our present excellent road beds.

As an association we have our bright and our dark days. We meet here today with 600 members. The number should be double, and would be if all roadmasters took the interest they should in their calling. Our ledger balance is in our favor, and there is no good reason why we should not go on more successfully than in the past, until we as an association stand as an authority on all questions pertaining to the track department.

We meet here in my native state, within sound of the mighty Niagara, whose immense power will soon be given to light and help turn the wheels of progress, and when the business of this convention is finished, we hope one and all of you will be able to enjoy the many sights about the falls and the excursion across the lake.

After the president's address, Messrs. Caffrey, Kirwin and Collins each made some pertinent remarks about the work of the association, its value to the respective members and the necessity of each member taking an active part in the discussion of reports.

The proceedings as printed were accepted, after which Mr. J. B. Dickson, secretary and treasurer, read the following report:

Received during term ending Sept. 5, 1896 -	$1941.05
Expended " " " " " - -	1325.59
Balance on hand - - - - - -	$615.46

The president announced that the executive committee had carefully examined every detail of the accounts of the secretary and treasurer and found them correct. A vote of thanks was unanimously extended to the secretary and treasurer, after which the following applicants for membership were unanimously accepted:

Howard H. Lincoln, N. Y. C. & H. R. Railroad.
Myron R. Winefield, N. Y. C. & H. R.
Thos. McKeene, L. V. R. R.
M. J. Greeney, L. V.
M. E. Rogers, H. & T. C.
F. R. Coates, Baltimore & Ohio.
T. J. Steinson, M. & C.
Sterling Prince Adams, R. W. A. C. L.
I. N. Blair, D. M. & N.
R. S. Waldrep, F. E. C.
R. N. Gaylor, N. Y. C. & H.
C. G. Woodward, Everett & Monte Cristo.
Edw. Ryan, D. & R. G.
Walter Arthur Hill, Southern Pacific.
P. A. Friess, C. & N. W.
G. E. Mosler, Wis. division of Fon du lac R. R.
H. M. Levinson, R. G. division S. & P.
W. H. Brenton, Colorado Midland.
John P. Fitzgerald, J. R. V. & J. & N. division of N. P.
Geo. E. Hayward, C. L. & W.
Orlando W. Eggleston, Hudson division N. Y. C. & H. R.
E. A. Grooves, Rio Grande Western.
Chas. Selby, R. G. W.
John A. Taylor, N. Y. C. & H. R.
Richard Shea, N. Y. C. & H. R.
Geo. N. Dixon, P. M. & C.
W. R. Burns, N. Y. C. & H. R.
Martin D. Rice, U. & N.
Jos. C. McMurrin, Union Pacific.
M. Rogan, M. L. & S. division of S. P.
J. E. Platt. Southern R. R.
Henry Ware, B. R. & P.

The convention then adjourned until 2:00 p. m. in order to give members an opportunity to sign the register, pay their dues and inspect the exhibits made by manufacturing concerns.

The first business at the afternoon session was the election of officers for the coming year, which resulted as follows:

President, R. Caffrey, Lehigh Valley Ry.: first vice president, A. S. Western, New York Central: second vice president, T. Hickey, Michigan Central: secretary and treasurer, J. B. Dickson, Northwestern: member executive committee, Wm. Brandt.

Reports of committees was next taken up, the first one being on the subject of tie plates, which was read by the secretary. This report brought out a lengthy discussion, which was practically as follows:

Mr. R. P. Collins, N.Y. N. H. & H.—I agree with the committee in its opinion that tie plates will hold rails to gage on curves and will give better results than rail braces. On the road with which I am connected we have a curve of 6 deg. from which we removed rail braces and put in tie plates, and the result has been that the curve has not been regaged for five years. Before using the plates the ties had to be repeatedly adzed down with the result that the ends would be cut away until the ties had to be thrown out, while the center was still good. In one of our yards where there is a large amount of heavy switching, we formerly renewed the ties every two years, but four years ago we put in tie plates and at the present time the ties appear to be as good as when put in. The first plates put in had no shoulder and at the end of about two years the spikes were found badly worn and were replaced. Of late we have used plates having shoulder and have had no trouble of this nature. The shoulder on the plate is, in my opinion, indispensible on curves, and there can be no objection to it on plates used on tangents. Tie plates on every fourth tie of curves of 10 per cent will hold the rails to gage, but rail braces so distributed will not do so.

Mr. A. M. Hawkins, Norfolk & Southern—All curves on our line are equipped with tie plates, and this practice is to be adopted on tangents just as rapidly as possible. Where we use oak ties the plates are put on every third tie, but where soft wood is used they are put on every tie. Most of our ties are either cypress or white cedar. There can be no question about the plates prolonging the life of ties, and I think the committee is not far wrong in saying they will prolong the life of ties six or seven years. Where plates are not used the ties are rapidly cut to pieces by respiking. We do not find it necessary to use rail braces in conjunction with the plates, but we find that it is important to have a shoulder on the plates.

J. H. Dodson, Southern Ry.—We have about 500,000 tie plates in use, most of them being on soft wood. On oak ties we use them only on curves of 3 per cent and less. We have tried plates 3¾ in. wide but found that they were not wide enough, and have adopted a plate 5 in. wide for intermediate and a 6 in. for joint plates. We have, however, one section where the traffic is very light laid with cypress ties without plates, which have been in use some 14 years. These ties have rotted out and we have secured their natural life, consequently tie plates would have been of no benefit. The shoulder on a plate adds about two cents to the cost, and I do not believe that it is worth that amount.

Jos. Hayward, K. C., St. J. & C. B. Ry.—The ties on our road are all of oak, and we use tie plates on all curves and in yards, and find they add from two to three years to the life of the ties.

John Ross, F. & P. M. Ry.—On our road we put tie plates in on three curves about three years ago, and have not found it necessary to respike any of them since that time, while formerly we had to respike each of them about once a month. I think the tie plates will hold the rails just as well as rail braces, and they do not require so many spikes.

It was unanimously decided that it was the opinion of the association that tie plates will hold the rails to gage on curves. There was an extended discussion on the advisability of using a shoulder, and it was decided by a vote of 39 to 7 that it was advisable that a shoulder be used extending the full width of the plate. It was further voted that the use of tie plates makes rail braces superfluous, after which the report of the committee was adopted as being in accordance with the views of the association.

At the Wednesday morning session the first proceeding was the reading of the report on the best method of protecting facing point switches, which report was accepted, and the report on ditching read and accepted.

The report on the elevation of rails on curves was next read and the discussion thereon continued to the evening session.

At the Wednesday evening session the report on elevation of rails on curves was slightly changed and adopted as found on another page. The report on frogs and switches was next taken up, and after a short discussion was accepted as information and ordered printed in the proceedings.

The location for the meeting of the next convention was taken up and on the final ballot Norfolk received 46 votes and Grand Rapids 31. It was decided to meet at Norfolk on the second Tuesday in September, after which the meeting adjourned.

THURSDAY MORNING SESSION.

The first business on Thursday morning was a discussion on the subject of rail joints, and some of the remarks on this subject were practically as follows:

Mr. H. C. Stickney, Boston & Maine Ry.—We have on our road both the Weber and Continuous rail joints and find them equally good although we have not had so much experience with Weber as with the Continuous joint.

Mr. Coates—We have used the Weber joints with very good results. Some of them have been in use over three years, having been put in on old rails and they have brought up to a level joints which had been low. These joints can be kept up at a much less cost than the splice bars.

Mr. Dickson, C. & N. W. Ry.—We have had 1½ miles of long truss joints in use since 1889 where the traffic is very heavy. This piece of track is in good condition and is kept up at a very low cost and with little trouble.

J. W. Shanks, Central Vermont Ry.—We have been using angle bars on supported joints and find they break from the top down. About three or four years ago we put in some Continuous and some Weber joints. The latter have given very good results but only 12 of them were put in. The Continuous joints were put on rails which had been in the track 16 years and the result has been that low joints have been brought back to a level. We are now putting 20 miles of these joints on new 75 lb. rail. My opinion is that the Continuous is the best in use but have not had much actual experience with others.

W. H. Burns, N. Y. C. & H. R. Rd.—We have about 25 miles of Continuous joints in use on rails which were put in in 1880 and find they are improving the condition of the joints.

The next proceeding was the reading of the report on ballast. This report was accepted after a short discussion.

The committee on resolutions rendered its report. The retiring president made a few remarks regarding the work of the association, and the incoming officers each made a short speech, after which the convention adjourned, to meet at Norfolk on the 2nd Tuesday of September, 1897.

Exhibits at the Convention.

Among the exhibits at the Roadmasters' Association convention at Niagara Falls we noticed:

The Eyeless Tool Co., of New York, exhibited eyeless pick axes, represented by M. F. Wood.

The National Jack Co., of Boston, had a jack of new principle which could be moved to any angle after the load is lifted. It would seem to have a great future as a wrecking jack, and attracted much attention. Wm. B. Durfee and C. B. Cook, secretary and treasurer, were present.

The Excelsior nut lock was shown by Ruffner & Son, of Philadelphia, Pa.

The Pennsylvania Steel Co., of Steelton, Pa., showed several Long Safety switch stands of various styles.

A. O. Norton, of Boston, exhibited the Norton ball bearing jack.

The Ramapo Iron Works of Ramapo, N. Y., displayed switches and stands and brake shoes.

The Continuous Rail Joint Co., of Newark, N. J., was represented by Mr. A. W. Thompson, general manager, who showed a number of their continuous joints and large photographs of joints as used on many roads. Mr. L. F. Browne of this company was also present.

The Wharton Railroad Switch Co., of Jenkintown, Pa., showed frogs, switches and other specialties.

The International Correspondence School of Scranton, Pa., displayed books and drawings illustrating their system of instruction.

Hussey, Binns & Co., of Pittsburgh, showed shovels of various styles.

The Verona Tool Works of Pittsburgh, displayed the well known Verona nut locks and track drills and jacks. President Paul of this company was present.

The Elliot Frog & Switch Co. of East St. Louis, made a very neat exhibit of nickel plated models of spring rail and rigid frogs, switches, etc., and also blue prints of various forms of these devices.

Pettibone, Mulliken & Co. made an exhibit of track jacks, rail braces, etc., and was represented by Mr. James C. Ball.

The Railroad Supply Co. made a very extensive exhibit of Wolhaupter arch and girder tie plates. These plates were exhibited in place in ties which had been removed, and a very good portion of the exhibit was a report of service made by Robert W. Hunt & Co., after having made examinations of plates in use. Mr. Benj. Wolhaupter represented the company.

Fairbanks, Morse & Co. were represented by Mr. G. J. Acres, W. F. Pierce and Mr. Willis C. Squire, the latter also representing The Sheffield Car Co. This company exhibited Barrett track and bridge jacks, Sheffield hand and velocipede cars and track drills. The Sheffield gasoline motor velocipede attracted a great amount of attention and favorable comment.

The Page Woven Wire Fence Co. exhibited a section of coiled spring fencing put up in position, and also rolls of fencing and nickel plated models. Messrs. E. G. Fisher and W. H. Burnham represented this company.

The Buda Foundry & Manufacturing Co. exhibited hand and velocipede cars, and also two patterns of the Pauliss trade drill, and was represented by Messrs. F. H. Ingals and W. H. Stearns.

The Q & C Co. exhibited the Servis tie plate and was represented by Messrs. C. F. Quincy, Benj. Reese, C. Stein, J. Burnett and H. W. Worthington.

The Truss Rail Joint Co. was represented by Mr. H. H. McDuffee and had on exhibition a full size joint and blue prints.

Mr. E. S. Hart exhibited a working model of the Rogers Ballast Car. and it attracted the attention which it always does when placed on exhibition.

Safford & Moore exhibited a 24 and an 18 trip jack, a 21 in. raise and lower jack, an 11 in. tie setter, and was represented by Messrs. M. M. Moore, J. B. Safford, N. W. Williams.

The Railway Cycle Manufacturing Co. exhibited two inspection cars, one having a gasoline motor attached. These cars attracted much attention and their good points were explained by Messrs. J. H. and C. M. Teeter.

TRACK ELEVATION IN BOSTON—N. Y., N. H. & H. R. R.

The work of elevating the main tracks of the New York, New Haven & Hartford Railroad between the Roxbury shops and Mount Hope in Boston has been carried to a point which permits of running the trains upon the elevation and doing away with the grade crossings at eleven different points by overhead bridges, and at four other places parkway passages have been made under the embankment. This work was described in the RAILWAY REVIEW of April 4 and 11 of the current volume, in which it was noted that the elevation necessitated the purchasing of additional property and the changing of the channel of Stony Brook for a total distance of about 3,900 ft. It was also necessary to move about 130 buildings. The work may be said to be considerably more than half done for the reason that the filling of the remaining portions of the embankment can be carried on from the trestle work already erected, which will greatly facilitate operations. The plans and work of the elevation have been under the charge of Mr. C. M. Ingersoll, constructing engineer. The plans were all prepared and the filling and tracklaying were done by the railroad company, the masonry, bridges and stations having been let to contractors. The masonry part of the work was divided into two sections, the north half of which was contracted for by H. H. Brown of New York under whom Shipman & Daly and Lathrop & Shea were sub-contractors. The south section was let to J. J. O'Brien & Co. of New York. The time set for the completion of the work is January next, the foundation work for the east retaining wall having already been commenced.

A PECULIAR WASHOUT.

An accident occurred on the Lake Shore & Michigan Southern Railway on the morning of August 13 which is unique and peculiar from the fact that a high bank was washed out while a train was passing over it, the strangest feature of the case being that an ample waterway had been provided under the bank by means of a stone arch culvert. The extent of the displacement of earth is clearly indicated in the accompanying illustration, which was prepared from a photograph taken before the train was removed. The accident occurred near Otis, Ind., to an east bound train. The view shown is looking north.

At the time of the accident, 4:00 a. m., the washing had not thoroughly undermined the tracks, for the locomotive, two mail cars and express car passed over the sag, although they were derailed on the east side of it, the locomotive turning over on its right side. The next car was a passenger coach,

A PECULIAR WASHOUT.

which came to a standstill in the sag and the occupants had gotten out and reached places of safety before the track under the coach caved in. A sleeping car at the rear of the train was on the west side of the hole and in a safe position, so that it was hauled away from the wreck soon after. About 3:00 o'clock in the morning a very heavy shower passed over this section and an unusual amount of water fell. The surrounding country is heavily rolling and consequently the waters reach the streams very quickly in cases of heavy rains and swells them to many times their normal size.

This washout occurred at what is known as culvert No. 39. It was a stone arch culvert 85 ft. span and to all appearances was in good condition. The stream flowing through it to the northward is ordinarily about six inches deep and about four feet wide, but on this occasion the water reached a depth of about eleven feet near the mouth of the culvert. The cause of the accident is not positively known, but it is quite probable that the culvert became suddenly choked with drift material, which caused an immense accumulation of water at its mouth and this began cutting in behind the wing walls. The railroad is built on a heavy embankment at this point, the distance from the base of rail to the bottom of the culvert being about 40 ft. About two-thirds of the culvert was demolished leaving a hole 90 ft. wide and 40 ft. deep. The south end of the culvert collapsed after being undermined and the central portion was completely washed away leaving about one-third of the culvert on the north end intact.

Some remarkable work was done by the forces of the road in getting the line open again, the work of clearing away the debris and erecting a temporary trestle occupying but little over forty-eight hours. This trestle was started at once and was built of frame and pile bents. As soon as this temporary work was done a permanent pile trestle for the east bound track was commenced and pushe dnight and day until ready for trains on the afternoon of the August 17. This furnished a good and safe passage for all trains so the work on the west bound trestle was confined to daylight and pushed to completion as soon as possible. The wreck was one which could not have been forseen and the road is entitled to great credit for the prompt and efficient manner in which the line was opened again. In view of the fact that there were many passengers in the coach shown in the illustration it must be considered a matter of good fortune that not more than two lives were lost. These two were the locomotive crew.

A WHITEWASH SPRAYER.

The Chicago & Northwestern Railway has taken up the matter of improving the appearance of the shops of the locomotive department at West Chicago, and has also greatly improved the distribution of light in the buildings by applying whitewash to the interior walls and, where possible, to the ceilings. The cost of doing this work was greatly reduced by the pneumatic appliance shown in the accompanying illustration for the spraying of the whitewash. This device consists of a locomotive air brake reservoir mounted on a three-wheeled truck for convenience in moving about the shops.

A hose connection is made to the air supply which is brought into the reservoir by means of a ¾ in. pipe, which passes down into the liquid and terminates with a bend near the bottom of the cylinder. The object of this is to cause the incoming air to bubble up through the liquid and keep it constantly stirred up and this has much to do with the success of the apparatus. The air pipe is equipped with a globe valve for regulation of the air admitted and upon the end of the hose connection which is farthest away from the sprayer a small reducing valve is placed for the purpose of reducing the pressure from the air mains to the proper amount for spraying. The spray of whitewash is obtained through a nozzle connected by a piece of ¾ in. hose to a mixer or ejector located upon the top of the tank. This part of the apparatus consists of a short length of 1 in. pipe, connected by means of a "T" to the top of the reservoir. A ¼ in. pipe passes downward into the liquid and connects through a reducer into the 1 in. pipe. It was found that the spraying was more perfectly done by having the liquid delived into the center of the air supply and the fineness of the particles of whitewash obtained in this way is such as to resemble a mist in which there was an entire absence of drops. This renders the operation of whitewashing much cleaner than it usually is, which was one object sought. In connection with this arrangement a simple grinder was used through which all of the lime was passed before being placed in the reservoir, insuring its fineness and freedom from lumps.

This comes to us from a reader:

If a dollar be a dollar—honest coin—without deceit—one may melt it, one may smelt it, but its value won't retreat.

Melt ten dollars—silver dollars—in unbiased melting pot, and the silver "slug" resulting only sells for "five the lot."

Melt gold dollars—melt an eagle in aforesaid melting pot—and the golden slug resulting quickly sells for "ten the lot."

Will you tell me—kindly tell me—how these dollars equal are—if a little glowing furnace put on only a scar?

There was never yet equation that demanded legislation to establish right to be—an equation is equation—else it is a fallacy!

And I'm thinking—quietly thinking—that a poor man has poor sense—if he votes to have a dollar—that will melt to 50 cents.

—[Concord (N. H.) Monitor.

MASTER MECHANICS' ASSOCIATION SUBJECTS FOR 1897 CONVENTION.

The following list of subjects for the 1897 convention of the American Railway Master Mechanics' Association, with the names of members selected for the committees, has just been received from the secretary, Mr. J. W. Cloud.

1.—Exhaust Nozzles and Steam Passages—(Continued)—The discussion of the report for 1896 was made the first order of business for 1897. Members who can do so are requested to co-operate with the committee by experimenting upon its conclusions and reporting to the committee, which will report further to the convention of 1897 as introductory to the discussion. Robert Quayle, Wm. Forsyth, Jas. McNaughton, W. S. Morris, D. L. Barnes, W. F. M. Goss.

2.—Counterbalancing Locomotives.—(Continued)—To designate a number of roads to confirm or disprove its recommendations in the report of 1896, and to report the results to the convention of 1897. F. M. Herr, W. H. Lewis (C., B. & N.), C. H. Quereau, S. P. Bush.

3.—Truck Swing Hangers—(Continued)—To advise the proper angle for swing beam hangers in locomotive trucks G. L. Potter, Wm. Garstang, M. N. Forney, W. Lavery John Mackenzie.

4.—Locomotive Grates—(Continued.)—What kind of grate is most suitable for burning anthracite coal, the cast-iron shaking or the water bar? H. Wade Hibbard, B. Clark E. L. Coster, Geo. W. West, David Brown.

5.—The Apprentice Boy.—(Continued.)—To recommend a course of shop training for apprentices in the locomotive shops and to make recommendations in regard to the technical education of shop apprentices. W. F. Bradley, G. R. Joughins, H. P. Robinson, W. H. Harrison, A. E. Manchester.

6.—Best Metal for Cylinders, Valves and Valve Seats.—(New)—What kind of metal, hard, medium or soft, should be used in locomotive cylinders, valve seats and valves? Should the metal for valve seats and valves be the same or different? J. N. Barr, G. F. Wilson, G. W. Stevens, F. W. Morse.

7.—Boiler Jackets.—(New)—Which is the most economical, a boiler jacket of planished iron or a boiler jacket of common sheet iron or sheet steel, painted? The general appearance, first cost and cost of maintenance to be considered. A. E. Mitchell, C. G. Turner, T. B. Purves, Jr., J. E. Sague, E. L. Coster.

8.—Ratios of Grate Area, Heating Area and Cylinder Volume.—(New)—For engines in both passenger service and freight service, and whether burning anthracite coal or bituminous coal, what should be the ratio of grate area to heating surface and to cylinder volume? What should be the ratio between diameter of cylinder and length of steam port? G. R. Henderson, A. S. Vogt, R. Wells, S. M. Vauclain, C. J. Mellin.

9.—Piecework in Locomotive Repair Shops—(New)—Is it practicable and advisable to apply the piecework system in connection with locomotive repairs? What is the best method of arriving at the prices for the different operations? P. Leeds, Wm. Swanson, R. P. C. Sanderson, J. G. Neuffer, J. B. Michael.

10.—Motors: Steam, Air and Electricity—(New)—In a locomotive repair shop what class of work can best be performed by air motors, and what is the relative convenience and economy of air motors, electric motors and steam motors for such work? When such motors are used, should the shape of the cutting edges of the drills, reamers, etc., be different from the shapes used in ordinary practice? J. H. McConnell, John Player, W. C. Arp, W. Renshaw, V. B. Lang.

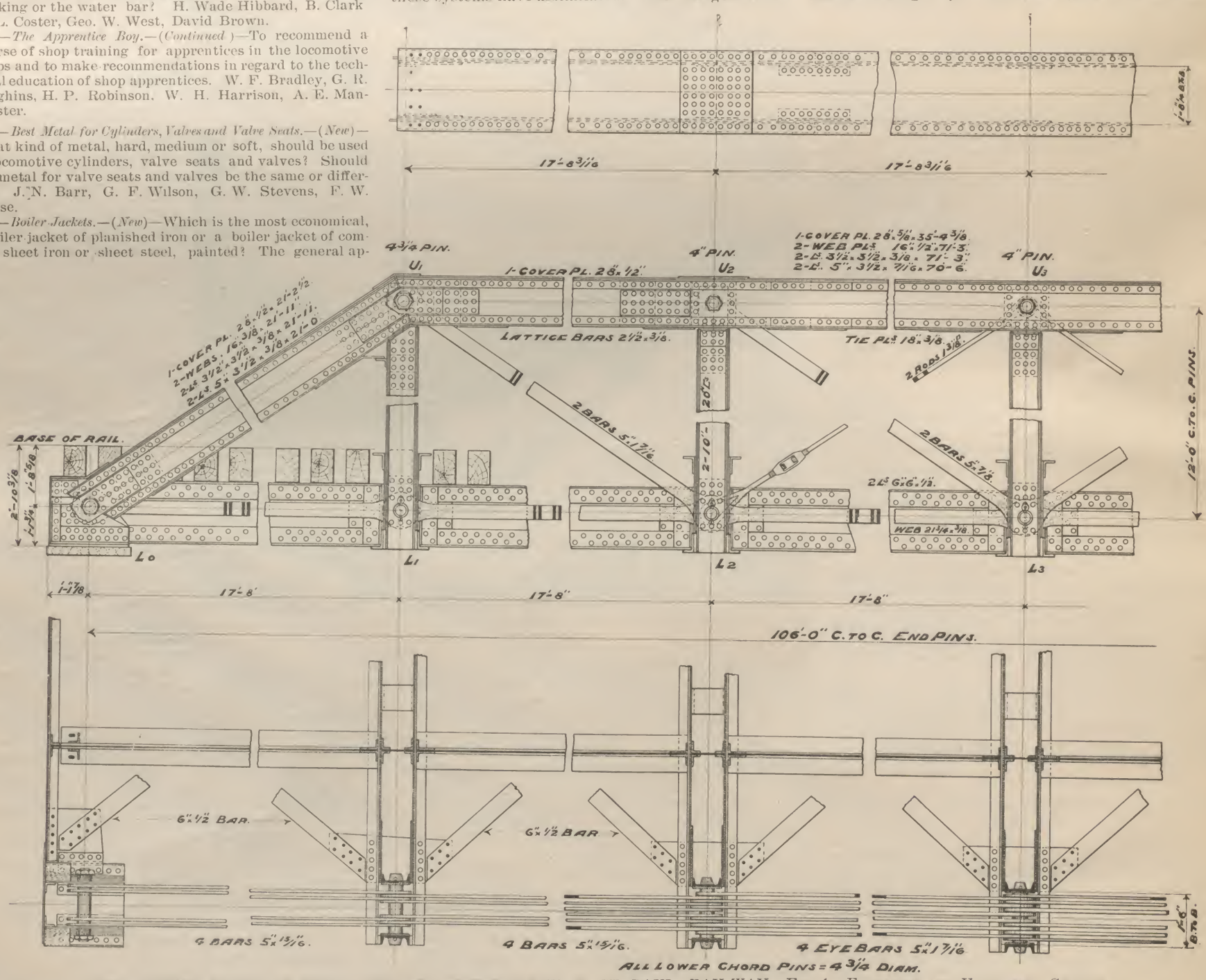
11.—Revision of Air Brake and Signal Instructions—(New)—G. W. Rhodes, B. Haskell, A. W. Ball, A. M. Waitt, C. H. Cory.

12.—Subjects for Convention of 1898.—W. H. Lewis (C. B. & N.), Tracy Lyon, C. H. Quereau.

A MODERN RAILWAY SPAN.

Fifteen or twenty years ago the expressions "English bridges" and "American bridges" were commonly used by engineers, and many were the discussions as to their comparative merits: the distinctive features of the two systems being that English bridges were structures with all connections riveted, and that American bridges were built with pin connections. Without repeating any of the old arguments in favor of either system, it is interesting to note how these systems have assimilated. The change is more noticeable on the part of the former supporters of the American practice than on the part of those who represented the English practice. It is easy enough to account for this by the fact that the Americans have had a greater number of bridges to build, and being comparatively free from conservatism, are open to conviction, and to the adoption of improvements. Twenty years ago American bridges were flimsy in comparison with those of the present day, both on account of the smaller sections and less weight, and because they were simply pinned and bolted together, it being frequently the aim of the designer to make a structure which required no field rivets, so that there was really a marked difference between the practices of the American and the British engineers.

In the evolution of the American bridge the good features of the American system have been retained, and those of the British or riveted system adopted. At the present day the best American practice is represented by plate girder spans up to 100 ft. in length; from 100 to 150 ft. by both riveted and pin connected structures, and for greater spans by pin connected bridges. In the pin connected structures only the main truss connections at panel points are pinned. Other connections, such as stringers to floor beams, floor beams to posts, and lateral sway bracing are riveted. Engineers seem to be unanimous as to the proper spans to be used for lengths under 100 ft. and over 150 ft., but between these two lengths there is much difference of opinion, so that whereas the former argument was between English and American bridges, it is now between lattice and pin connected bridges for spans between 100 and 150 ft. in length. The objections to pin connected bridges for such lengths of spans is that when "pony" or "half-through" spans are adopted, they are usually deficient in lateral stability, and the pin connected "pony truss" has by many been condemned as a flimsy and unreliable style of bridge. Plate girder spans of such length are objectionable because of their excessive weight, and if "through" pin connected spans are used the sections become so light that the bridge lacks lateral stiffness, and the members in the vertical trusses are so slight as to offer little resistance to blows from projecting loads and derailed cars. Latticed bridges for these lengths of spans are objectionable because of the great number of field rivets which are required; the trusses being too deep to ship bodily it is necessary for most of the riveting to be done in the field with unsatisfactory results, both as to quality and to cost.



PONY TRUSS SPAN, 106 FEET, CHICAGO, MILWAUKEE & ST. PAUL RAILWAY.—FIG. 1.—ELEVATION AND HORIZONTAL SECTION.

The Chicago, Milwaukee & St. Paul Railway has within the past few years replaced a good many of its wooden bridges with iron structures, and a study of the requirements of each particular case has developed the following practice, which is applicable

to ordinary cases, as exceptional cases must of course be treated with special designs: Plate girder spans are used for lengths up to 85 ft., using deck girders in preference to through girders whenever the requirements of the opening will permit; from 100 to 130 ft. pony truss spans are employed having floor beams with double webs and gusset plates to the posts, where the water way is such as to require a shallow floor, and deep floor beams of the ordinary pattern with wide gusset plates where the water way permits. For spans from 130 to 150 ft.. through trusses with riveted bottom chords are used and for spans greater than 150 ft., through trusses with bottom chords of eye bars.

The accompanying illustrations are of a "half through," or "pony truss" span, 106 ft., between centers of end pins intended for a 100 ft. clear span between masonry, and was designed to do away with the objections which have been mentioned, as existing in both the pin and lattice bridges of that length of span. This span complete with bed plates. steel guard rails, floor bolts and washers weighs 147,430 lbs. If it were permissable to occupy a foot and a half or two feet more of the depth below the

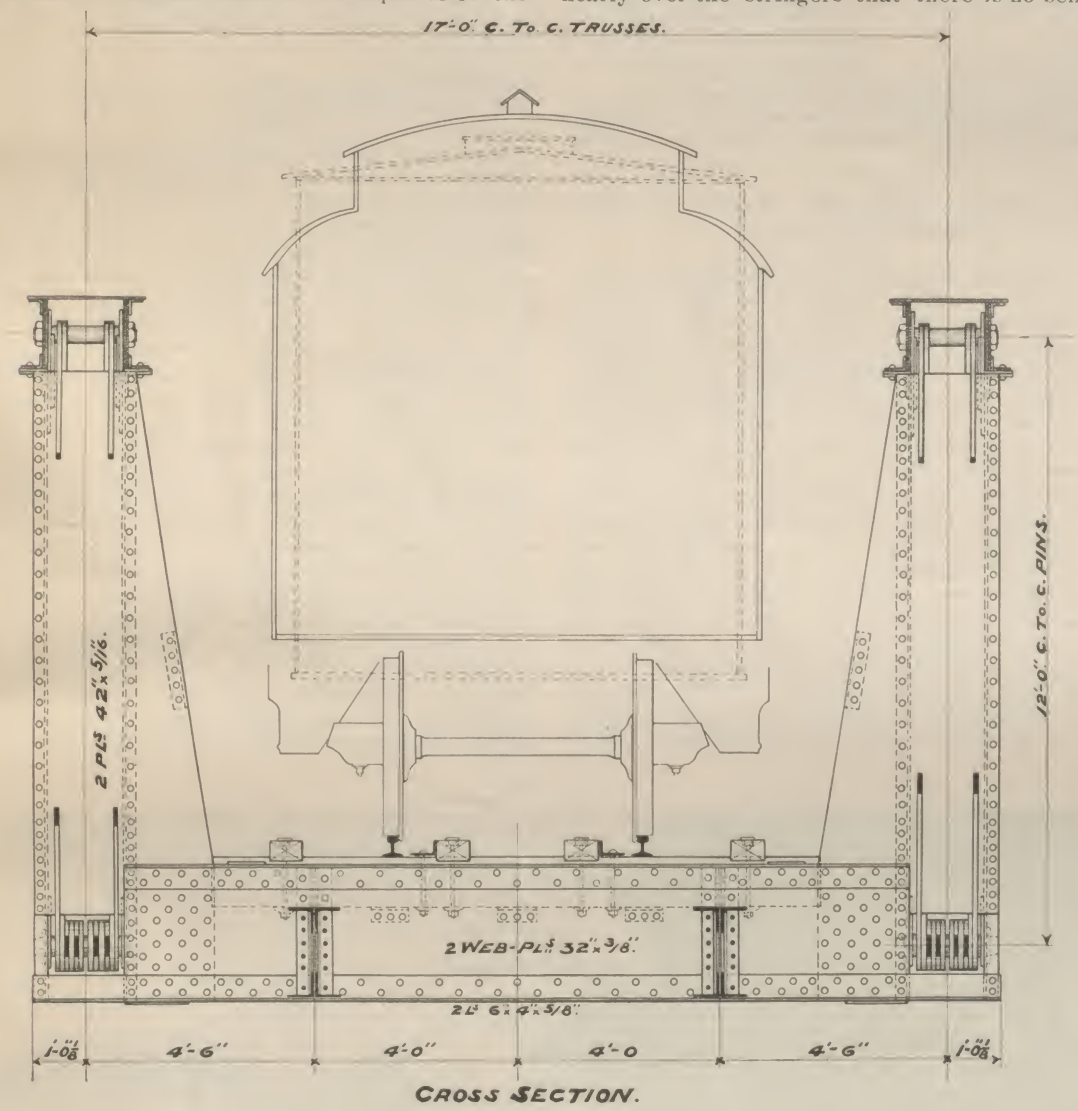


FIG. 2.—END VIEW SHOWING FLOOR SYSTEM.

rail, single webbed floor beams with single gusset plates could be substituted with some saving in weight, but for the cases in which this span has been used, the grain in head room under the bridge more than compensated for the small excess in weight. Seven spans have already been built from the plan illustrated and these have proved themselves exceedingly stiff and free from vibration, and as all intersections are riveted they are absolutely free from rattling. The flat angle of the end posts requires a heavy bottom chord, securing the advantages with eye bars, which are usually claimed for riveted box chords. Owing to the shallow depth of the truss the sections of truss members are all unusually heavy and capable of sustaining violent shocks. If a car should strike the end of one of of these spans it would ride up on the end posts and fall back on the track, or clear itself by falling into the stream. with the probability that the bridge would not be disabled. Lateral stiffness is secured by the width of the end posts and the top chords and the wide gusset plates with riveted connections to the floor beams. The top chords are riveted complete in the shops and are shipped in one piece for each truss. After erection and adjustment the hip joints are riveted to secure rigidly, and each vertical post is riveted to the top chord. The foot of each end post is riveted to the end shoe and to the end cross strut and the lateral bracing is riveted in place. This makes the completed structure a unit just as much as in the case with a plate girder span, and every claim which may be made for a plate girder span of the same length may also be made for this span. Floor beams and vertical posts are riveted in the shop, and the beam and two posts make one shipping piece. The bridge is easily and economically erected and the number of field rivets to be driven is not large. This is a so-called pin connected bridge and certainly is not a lattice bridge in the usual acceptation of the term, but it is to be noted that pins are used only to suspend the tension members and that the bridge is really a riveted structure with the tensile strains transmitted into the compressive members by pins.

A derailed wheel which is near enough in line to run on the 8 ft. cross ties of ordinary track will be guided on the one side by the 6 x 4 x ½ in. steel angle, which is backed up by a 5 x 8 in. wooden guard rail, while the opposite wheel will be so nearly over the stringers that there is no bending strain placed on the cross ties from it. The cross ties cannot be "bunched" on account of the four lines of guard rails which are framed down on them and bolted to keep them properly spaced. In the case of anything dragging on the track there are no projecting bolts or obstructions to catch. There is no occasion for any limit of speed on such a bridge and it represents perhaps what is the safest part on the track.

We are indebted to Mr. Onward Bates, engineer and superintendent of bridges and buildings of the Chicago, Milwaukee & St. Paul Railway, the originator of this design, for the description of the work and for the drawings from which the illustrations were prepared. Mr. Albert Reichmann had to do with the designing and the drawing was made by Mr. J. Weatherson.

THE ENGINEER AS A BUSINESS MAN.

Under the caption "The Engineer as a Business Man" the American Machinist urges the addition of a business education to the usual preparation of engineers for their work in life. A man cannot learn the whole of any engineering branch in four years. and this is another argument for training students rather than giving them information. The plea is as follows:

One of the most sensible suggestions connected with technical education that we have seen in years is now being urged upon the authorities of the Stevens Institute by its graduates. The suggestion is for courses of lectures on such subjects as bookkeeping, banking, investments patent law, laws of contracts and specifications.

We gather our information from the annual address of the president of the Stevens Alumni Association, from which we take the following pertinent words: "It must be remembered that the financial side of engineering is always the most important, and that the sooner the young engineer recedes from the idea that, simply because he is a professional man his position is paramount, the better it will be for him. He must always be subservient to those who represent the money invested in the enterprise.

The fact that mechanical engineering is primarily a matter of business, and not of scholarshiy, is ignored altogether too much in our engineering schools. The average fresh graduate looks upon the "mere business man" as of a distinctly lower order than himself, while the business college is considered as a subject for contempt. And yet, limited as is the instruction of the business colleges, we have no hesitation in saying that, to the graduate who has had no contact with business, a supplementary course in such a college would be of more value than any equal period of time in his technical course. Every man of intelligence should have a correct idea of modern methods of bookkeeping and banking, while to the engineer a knowledge of patent law and practice, and of contracts and specifications, is, sooner or later, a necessity.

The ignorance of too many business managers of the technical side of their business is a subject of constant jeering by mechanical specialists; but the equal ignorance of business considerations on the part of technical men is equally and justly a subject for derision by the business man. This ignorance is, in fact, too often simply discreditable, and does more than any other one thing to limit usefulness of engineers. Back of all this, a knowledge of both bookkeeping and technology is involved in a subject of fundamental importance, cost-keeping, and the man who combines a knowledge of both subjects can be of the greatest value in this direction.

It was a knowledge of these facts which led Mr. Eckley B. Coxe to deliver his eulogy upon the business engineer, whom he characterized as of the highest order and the best paid of his profession.

The interest of technical school graduates in the progress of their "Alma Mater", is a most cheering sign, and it is but natural that such suggestions should come from them. Made up, as most of our engineering faculties are, of men of little or no business experience, they must depend largely upon their alumini for suggestions and assistance in these directions, and they can do no better than to follow them. When technical men become also business men we may look for less friction between the two sides of every manufacturing business, and for a new and better order of things in our industrial enterprises.

The Traveling Engineers' Association.

The fourth annual meeting of the Traveling Engineers' Association was opened at Minneapolis, Minn., September 8, and a number of committee reports were presented and discussed. Copies of several of the reports were received too late for presentation in this issue, but selections will be made from them for publication hereafter.

CHICAGO, MILWAUKEE & ST. PAUL RY.

Thirty-Second Annual Report.

The thirty-second annual report of the Chicago, Milwaukee & St. Paul Railway for the year ending June 30, 1896, has just been issued. The business of the road, which embraces 6150.75 miles of railway, is shown to be well maintained, notwithstanding the prevailing depression during the year. The following is an abstract taken from the report:

The operations for the year show the following results:

Gross Earnings		$32,681,828 88
Operating Expenses (including taxes)		19,676,808 04
Net Earnings		$13,005,020 84
Income from other sources		64,857 13
Total		$13,069,877 97
Fixed charges—interest on bonds	$7,611,928 18	
Premium on bonds purchased	57,560 00	7,669,488 18
Balance above all charges		$5,400,389 79

During the year two dividends aggregating seven per cent were paid on the preferred stock, and two dividends aggregating three per cent were paid on the common stock—of which, the dividend paid October 21st, 1895—3½ per cent on preferred and one per cent on common stock—was from net earnings of the previous fiscal year, ending June 30th, 1895.

The results from operation of your Company's lines during the year ending June 30th, 1896, compared with the previous year, show an increase of $5,346,459.69 in gross earnings, an increase of $2,633,054.95, in operating expenses: and an increase

of $2,713,404.74 in net earnings.

The earnings from freight traffic were $23,887,930.06—an increase of $4,909,667.17, or 25.87%.

The number of tons of freight carried was 12,210,055—an increase of 1,734,113 tons, or 16.55%.

The increase in tons of freight carried was principally in the following commodities: flour and mill feed, 73,588 tons; wheat, 356,131 tons; barley, 166,830 tons; oats, 235,467 tons; corn, 64,322 tons; flax seed, 107,703 tons; other grains, 1,683 tons; hay, 28,957 tons; iron and steel, 98,664 tons; manufactures, 79,469 tons; forest products, except lumber, 133,534 tons; live stock, 59,721 tons. There was no decrease in any important item except lumber, which decreased 47,909 tons.

The number of tons of all agricultural products carried during the year was 3,846,426—an increase compared with the previous year of 1,051,680 tons, or 37.63%. Agricultural products made up 31.50% of the total tonnage, as compared with 26.68% of the total tonnage of last year.

The total number of tons of commodities other than agricultural, carried during the year was 8,363,629 as against 7,681,196—an increase of 682,433 tons, or 8.88%—the per cent of total tonnage being 68.50% as against 73.32% last year.

The number of tons of freight carried one mile was 2,381,667,988—an increase of 616,422,436, or 34.92%. The revenue per ton per mile was 1.003 cts.—a decrease of .072 cts. or 6.70%. The average miles each ton of freight was carried was 195.06 miles—an increase of 26.56 miles, or 15.76%.

The number of tons of freight carried per loaded car was 10.90, against 9.84 last year—an increase of 10.77%. The number of tons of freight per freight train mile was 167.08, against 152.16 last year—an increase of 9.81%. The revenue from freight per freight train mile was $1.6758, as against $1.6359 last year—an increase of 2.44%.

It is apparent that the increase in revenue from freight was due principally to the increase in tonnage of agricultural products, in consequence of good crops; and to the increase of 26.56 miles in the average miles each ton of freight was carried. These conditions were offset somewhat by the decrease in the rate per ton per mile; and on the other hand the expense of transportation was diminished by the increase of tons of freight per loaded car.

The average rate per ton per mile received for freights, for a series of years past, has been as follows, viz.:

1867.....3.94 cts.	1877.....2.08 cts.	1887.....1.09 cts.
1868.....3.49 "	1878.....1.80 "	1888.....1.006 "
1869.....3.10 "	1879.....1.72 "	1889.....1.059 "
1870.....2.82 "	1880.....1.76 "	1890.....0.995 "
1871.....2.54 "	1881.....1.70 "	1891.....1.003 "
1872.....2.43 "	1882.....1.48 "	1892.....1.026 "
1873.....2.50 "	1883.....1.39 "	1893.....1.026 "
1874.....2.38 "	1884.....1.29 "	1894.....1.037 "
1875.....2.10 "	1885.....1.28 "	1895.....1.075 "
1876.....2.04 "	1886.....1.17 "	896.....1.003 "

The earnings from passenger traffic during the year were $6,147,678 88—an increase of $294,897.72 over the previous year, or 5.04%. The number of passengers carried was 7,427,614—an increase of 192,315, or 2.66%. The number of passengers carried one mile was 260,821,497—an increase of 16,595,809, or 6.80%; the revenue per passenger per mile was 2.357 cents—a decrease of .039 cents or 1.63%; the average miles each passenger was carried was 35.12 miles—an increase of 1.37 miles or 4.06%.

EXPENSES.

	1895.	1896.
Repairs of Track	$1,425,383 98	$1,803,163 24
Renewal of Rails	454,113 56	468,727 13
Renewal of Ties	900,241 70	925,379 61
Repairs of Bridges	660,332 97	801,048 14
Repairs of Fences	67,067 00	74,994 19
Repairs of Buildings	196,326 40	301,411 35
Repairs of Locomotives	839,008 22	1,234,446 64
Repairs of Cars	1,195,563 78	1,629,271 08
Repairs of Tools and and Machinery	50,737 46	78,576 93
Management and General Offices	642,889 31	661,646 47
Foreign Agency and Advertising	160,040 77	170,459 26
Station Service	2,572,769 30	2,721,774 01
Conductors, B'g'e and Brakemen	1,393,577 95	1,585,374 79
Engineers, Firemen and Wipers	1,710,016 60	1,896,949 81
Train and Station Supplies	433,444 10	456,765 76
Fuel Consumed	1,813,415 58	2,008,513 11
Oil and Waste	112,174 11	115,526 47
Personal Injuries	159,160 65	146,063 17
Damage to Property	65,253 42	35,027 59
Loss and Damage, F't and B'g'e	69,017 50	70,584 80
Legal Expenses	140,798 67	134,004 08
New York Office Expenses	23,226 22	25,969 43
Taxes	1,084,700 45	1,082,083 74
Insurance	88,847 98	80,065 94
Miscellaneous Expenses	234,075 19	205,139 93
Stock Yard Expenses	10,571 67	10,558 49
Expenses of Elevators	20,733 18	27,002 53
Mileage of Cars	139,819 66	183,314 33
Sleeping and Parlor Car Expenses	67,685 27	75,084 51
Trackage and Switching Charges	312,760 44	317,881 51
Renewal Account		350,000 00
Total Expenses	$17,043,753 09	$19,676,808 04

RECAPITULATION.

	1895.	1896.	Increase.
Gross Earnings	$27,335,369 19	$32,681,828 88	$5,346,459 69
Total Expenses	17,043,753 09	19,676,808 04	2,633,054 95
Net Earnings	$10,291,616 10	$13,005,020 84	$2,713,404 74

For the year just closed the Railway Company's losses by fire were larger than ever before in a single year. In August, four of the Company's warehouses at Milwaukee and a number of freight cars and contents were destroyed by fire; and in June, thirty-four freight cars and contents were burned at Davis Junction. This last fire occurring so near the end of the year represents nearly all of the unadjusted losses for which $30,000.00 is set apart in the foregoing statement.

For the current year, therefore, the Insurance Department losses by fire will exceed its income from premiums and from investments by about $12,536.01—assuming that the amount reserved for unadjusted losses ($30,000.00) shall be sufficient to provide for the Davis Junction fire.

Taking the whole operations of the Department since its organization in February, 1893, its income has exceeded its expenses and losses by $176,372.06, and the original Guarantee Fund of $300,000.00 has been increased to $503,250.00, which is represented by $521,000.00 par value of bonds as per list below. The cash balance on hand June 30th, 1896, was $48,386.33, against which there is reserved for possible claims for unadjusted fire losses and expenses $32,000.00, leaving a balance of $16,386.33 applicable to the $50,000.00 loan made early in the year.

The Guarantee Fund of $503,250.00 charged on the Insurance Department books, is invested as follows:

$400,000	Chi., Mil. & St. Paul R'y Co. General Mortgage bonds	4 per cent.
10,000	" " " Consolidated Mortgage bonds	7 " "
2,000	" " " South. Minnesota Div. bonds	6 " "
2,000	" " " La Crosse & Dav. Div. bonds	5 " "
5,000	" " " Chi. & Pac. West. Div. bonds	5 " "
6,000	Dakota & Great Southern Railway Company bonds	5 " "
96,000	Kansas City Belt Railway Company bonds	6 " "
$521,000	par value of bonds that pay a yearly interest of	$23,230

THE WOOD CREOSOTE PROCESS FOR PRESERVING TIMBER.

The necessity for applying preservatives to timber, especially that which is used in railway construction, is giving evidence of being more and more appreciated, and will greatly increase with the introduction of simple and cheap methods of application. The supply of cross-ties is decreasing in quantity and they are not improving in quality. Many roads not having given much attention to this subject are now taking it up with a view of improving the quality of cheap ties and prolonging their life of service. The American Wood Preserving Company, manufacturers of woodiline, or "wood creosote," is meeting with favor in introducing this preservative, the characteristics and claims of which have been presented in these columns. This company has just issued a little pamphlet from the pen of Mr. Fred A. Kummer, C.E., which gives information with reference to wood preserving, and particularly concerning the application of woodiline. This little pamphlet is illustrated with engravings from photographs showing the application of this process to railways and bridges, and also illustrating the simple apparatus employed in applying it. The strongest claim made for this process beyond the satisfactory preservation of timber is that even when used on the hardest woods the only treatment required is the immersion of the timber in a hot bath of the liquid, the depth of the penetration and quantity of the preservative absorbed depending upon the duration of the immersion. The experience with this preservative covers a period of nearly 17 years, during which time it has been used without any extensive plant, the apparatus required consisting merely of a tank provided with steam pipes for the heating of the liquid. The accompanying illustration shows a view of a piece of track at Beverly, N. J. The ties shown are of oak and were treated by the wood creosote process in October, 1892, and a person who has examined them in the track states that they bear every outward evidence of a condition which should cause them to last from 15 to 20 years. For further information in regard to this process reference may be made the RAILWAY REVIEW of February 29 of the current volume, in which an illustration is presented. The circular referred to should be obtained by those interested in the preservation of timber.

A SPECIMEN OF TIE PRESERVED TRACK

TENTH ANNUAL REPORT OF THE DENVER & RIO GRANDE RAILROAD CO.

The tenth annual report of the Denver & Rio Grande Railroad, just issued, shows that the income of the company from all sources during the fiscal year ended June 30, 1896, including $57,334.90 received for interest, was $7,608,521.49, an increase of $677,080.93 compared with the previous year. The gross earnings from the operation of the railroad were $7,551,186.59, being an increase of $634,346.03. The operating expenses were $4,348,780.42, an increase of $357,568.51. The net earnings from traffic were $3,202,406.17, being $276,777.52 more than for the previous fiscal year. The increase in earnings was 9.17 per cent; in expenses 8.96 per cent and in net earnings 9.46 per cent. The net income afforded a surplus of $218,391.78 after providing for interest on funded debt, taxes, insurance and all other charges against income; also two semi-annual dividends of 1 per cent each upon the preferred stock and a portion of the additional standard gage equipment purchased during the year. Current liabilities show an increase of $229,994.58 from $1,432,729.40 in 1895 to $1,662,723.98 in 1896. The reason therefor is the dividend of 1 per cent on preferred stock ($236,500), declared in June and payable July 15, 1896. On June 30, 1896, the current assets exceeded the current li-

abilities $1,913,166.99, being a decrease of $79,503.68 from June 30, 1895, when the excess of current assets over current liabilities was $1,992,670.67. The unpaid vouchers at the close of the fiscal year, payable in the usual course of business during the succeeding month, amounted to $167,243.38, all for the month of June. There are no loans, overdrafts or other forms of floating indebtedness.

There has been a gratifying and steady growth in revenues from freight and passenger traffic since the great financial and industrial disturbance of 1893. For the fiscal year covered by this report the revenues from freight traffic were $5,179,049.73, against $4,819,904.92 for the preceding year, and $4,529,162.55 for the year ended June 30, 1894. This gain of $649,887.18 in two years indicates a constant improvement in and development of the districts traversed and evidences unmistakably the recuperative power of the state of Colorado. The passenger revenues for the year just closed were $1,478,911.04 against $1,183,270,19 for the preceding year. This increase of $295,640,85 indicates also a more healthful condition of affairs and greater ability on the part of the general public to afford the expense of railway transportation.

During the year 9,255 tons of steel rails were received and paid for, of which 5,266 tons are of our most recent pattern, the weight of which is 85 lbs. to the yard. Six thousand, seven hundred and fifteen (6,715) tons of new rails were charged to operating expenses before the close of the year and the remainder 2,540 tons are now being laid.

The management deemed it prudent to increase the weight of rails from 75 lbs. to 85 lbs. per yard on those portions of the standard gage main line where the traffic of the system is concentrated and the speed of passenger trains the greatest. The heaviest rails used last year were laid north of Pueblo, and it is the intention to relay in the near future with 85 lb. steel the balance of the 92 miles of single main track between Denver and Pueblo, provided the earnings will permit the expenditure. The relaying of the 28 miles of double track between these points will be deferred until a later time. The second hand rails released by the laying of new ones are used upon other parts of the system in place of rails of lighter weight now in use. The entire cost of the rail renewals hereinabove referred to, including the excess weight of new over old rails is charged to operating expenses. Upon the standard gage main line between Denver and Grand Junction, 455 miles, and the Trinidad branch, 91 miles, there are no rails carrying standard gage equipment of less weight than 65 lbs. per yard. It may be of interest to state that where 85 lb. steel is used in three rail track which extends from Denver to Leadville, a distance of 278 miles, the middle rail for the narrow gage equipment is 65 lbs. to the yard, making the total weight of steel per lineal yard of track, 235 lbs. Probably no other railroad has so great a weight of metal per yard of single track. Appended to the report is a diagram illustrating the growth of rails upon the system since construction was first commenced in 1871, which is here reproduced in exact scale and size. It is well worthy of your careful consideration, showing as it does the steady improvement that has been and is being made in the physical condition of the property.

EXPERIMENTS WITH RIBBED GLASS.

The Boston Manufacturers' Mutual Fire Insurance Company has received a report of the tests made under its direction by Prof. C. L. Norton of the Massachusetts Institute of Technology upon the relative illuminating power of ribbed and smooth glass which shows the superiority of ribbed glass for windows and skylights. The report is as follows:

The glass experimented upon was furnished by the Boston Plate & Window Glass Company. It included ribbed or fluted glass of four grades. No. 1. was 3-16 in. thick and had four ribs to the inch; No. 2 was ⅛ in. thick and had 11 ribs to the inch; No. 3 was ⅛ in. thick and had 21 ribs to the inch, and was of a strong greenish tint; No. 4 was same as No 3, but was nearly colorless; No. 5 was ⅛ in. thick rough plate; No. 6 was ⅛ in. thick white cathedral; No. 7 was ⅛ in. thick white ondoyant; No. 8 was single thick ground glass; No. 9 was yellow tinted plain glass.

Photometric comparisons of the intensity of the light from two windows similarly situated, one glazed with plain glass and the other with ribbed glass show a difference of from 50 to 200 per cent in favor of ribbed glass. The ribbed glass, No. 4, the best of those tested, transmitted with ribs horizontal, in a direction perpendicular to its plane, 2 9 times as much as plain glass, and in a direction 30 deg. to the right and left, 2.5 times as much as plain glass, and in a direction 60 deg. to the right or left, 1.9 times as much as plain glass.

It may be well at this point to describe briefly the distribution of light in a room when illuminated through ordinary window glass. In both fair and cloudy weather the general resultant direction of the light entering through a window is downward, ordinarily at an angle of 40 or 50 deg. The brightest portion of the room is therefore the floor in front of the window. As a floor is not, as a rule, a good reflecting surface, a large amount of light is absorbed there and lost. Such light as is reflected goes upward and backward toward the ceiling. Such light as falls on the wall spaces between the windows must therefore be mainly light which is diffusely reflected from the floor and objects upon it. Early in the morning and toward evening the angle of the incident light with the horizontal is less, and the light therefore penetrates further into the room, but the wall spaces between windows gain but little by this greater obliquity.

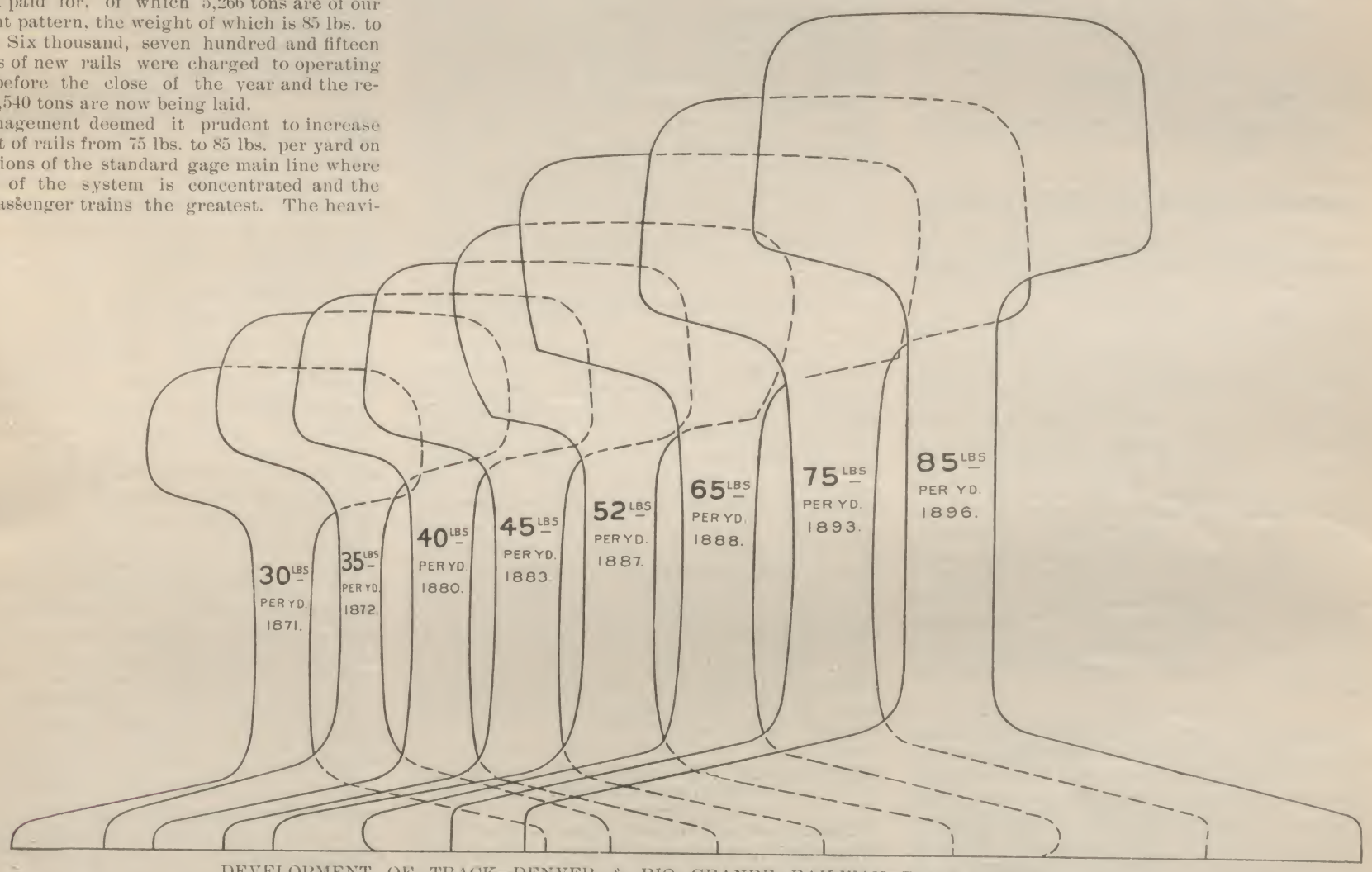
If panes of ribbed glass be substituted for the plain glass the bright spot on the floor in front of the window disappears, and the entire floor, walls and ceiling appear of sensibly the same brilliancy. The action of the ribbed glass appears to be prismatic, the greater part of the light falling on the ribbed glass at any point being refracted and spread out into a fan-shaped beam lying in a plane nearly perpendicular to the plane of the glass and to the direction of the ribs. This being recognized as the probable action, photometric measurements of the intensity were made at a distance of 8 ft. back of the glass in a horizontal plane, at five angles in this plane.

Two panes of glass whose relative merits were to be compared, were set one above the other in a large window having a southern exposure. On the inside, with the panes for centers, were built two rooms, semicircular in plan, and each about 3 ft. high and 8 ft. radius. Outside the rooms was a photometer room entirely enclosing both. The panes were 18 in. square. At corresponding points in the two rooms holes were cut in the side walls and discs of semi-transparent membrane, ground glass or paper were placed over the holes. One hole was directly opposite the pane and the others were at 30 and 60 deg. to the right and left. The holes in the lower room were directly under those in the upper room, and by means of a system of mirrors any two corresponding discs could be viewed side by side. If one disc was brighter than the other, the corresponding pane was obscured by a shutter sliding across it until the discs appeared equally bright. The amount of light falling upon the two discs now being the same, the amount transmitted per unit of area of the glass is inversely as the area exposed.

It must be distinctly understood that I do not mean that this gives the amount of light actually passing through the glass but simply the amount which passes through in such a manner as to be available at the discs. Thus, if half of the ribbed glass pane has to be obscured in order to equally illuminate two corresponding discs, the ribbed glass is transmitting to the disc twice as much light per square inch as is the plain glass, and hence of two equal windows the ribbed glass window would give to objects situated in the general direction now occupied by the disc twice as much light as the plain glass window.

None of the other samples gave such efficiency as did the ribbed glasses, the fine ribbed No. 4 being the best. It was found that the effect of having the ribs horizontal was to give an increase of light at the middle hole and a less increase at the sides. Whereas the vertical ribs gave a greater increase at the sides and a less increase at the middle. The horizontal ribs tend to throw the light which would otherwise fall to the floor straight ahead far into the room, while the vertical ribs spread out the light on both sides. It is, however, useless to discuss the measurements of the distribution with horizontal ribs, as the brilliancy of the glass itself is then so great as to be unbearable, rendering its use in this position out of the question for most purposes.

The diffusion of heat was much the same as the diffusion of light. There was no spot where the heat rays from outside streamed directly in when ribbed glass was used, and objects near the window were cooler than when plain glass was used by from 4 to 15 deg. F. However, the ribbed glass itself is hotter than the plain glass and the temperature of the air in the two cases was not sensibly different.



DEVELOPMENT OF TRACK—DENVER & RIO GRANDE RAILWAY—DRAWN TO SCALE.

THE RAILWAY REVIEW

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CHICAGO, SATURDAY, SEPT. 12, 1896.

SOME railway officials express very grave doubt of the efficiency of the work directed by railway managers toward inducing their employes to vote for sound money. The manager of a large system, a sound money democrat, who has risen from the ranks, recently said that he knew the literature sent out by railway officials was doing actual harm. The minds of the men are prejudiced against what they deem an effort on the part of their employers to control their votes. The effort to form a class of railway employes and the use of the term "the railway vote" he deems unfortunate. Railway employes should not be separated by their employment from other voters. The way to reach them is through the same political agencies as are used for other people. It is true that the issue in the present campaign is a business one which comes home to every one; but too much care cannot be used to avoid the danger of class prejudice. American workingmen have great abhorence of the idea of ownership or control of their votes.

SPECULATIVE influences have made some commotion in the crude iron trade in anticipation of an expanding demand and higher prices, due to considerable gold importations during the past week or two. Present conditions in the steel industries present nothing encouraging. Ore, coke, coal, Bessemer billets and structural shapes are all higher than unprotected competition would allow. Much enterprise holds aloof and capital stands afar off watching the turmoil of political battle. Foreign iron and steel markets are comparatively more active and foundries mills, yards and shops are doing better than we. The present is a critical time for this reason: Capital and enterprise are merely in temporary hiding. Urgent necessities of voluminous measure await opportunity. All large manufacturing interests discount this fact or probability. Production is being vigorously curtailed in all branches, never before so completely and methodically. There will be no immense stocks to unload when the curtain rises. Producers will be called upon to furnish. This is the emergency we have to face and hence the premonitory symptoms manifested even so far in advance as now.

AN abstract of a paper was published in our issue of July 25, in which a number of valuable suggestions were made with reference to the possibilities of improvement in the operation and care of locomotives by travelling engineers, or, as is perhaps better expressed by the title "Road-Foremen of Engines." There is no longer any doubt of the usefulness of these members of the master mechanics' staff and on the contrary the opinion is gaining ground that is necessary for the master mechanic to have such an assistant, not only as to keep him informed as to the management of the locomotives on the road but also to act the part of an instructor and an advisor of the engine runners. In the matter of the economical use of coal, the road foremen of engines can perhaps do the best work for the road and it is in this direction that their services seem to be most noticeable and are perhaps most fully appreciated. In addition to this field there are several others among which the condition of the locomotives as regards imunity from break downs is perhaps next to the economy of fuel in importance. It is noticed in the paper that upon the Chicago & Northwestern Railway the number of engine failures from all causes on the entire system has been reduced fifty per cent by the efforts of the road foreman of engines. The influence of a thoroughly informed and practically expert locomotive runner promoted to such a position as this must, in the case of a properly selected individual, be beneficial in assisting the men to improve their work, but it is highly essential that this selection should be carefully done because much depends upon the personality and the methods of the foreman. While the question of authority is important and the foreman should be provided with sufficient power to make his suggestions and instructions the equivalents of commands when necessary, it is thought that much more is to be gained by tactful handling of the men and an urging rather than a driving policy, and the foreman should act as a "friendly instructor" as is suggested by Mr. Slayton and not as a fault finding critic. It is noticeable that those master mechanics who receivd the most valuable suggestions from their subordinates give heed to every idea advanced by them and make suitable acknowledgement and encourage the men to suggest more improvements by not treating such matters lightly. Is not this a good principle to apply to the road foremen, as Mr. Slayton suggests?. The attitude toward inquiries has much to do with the development of new methods and much interest in their every day work may be stimulated by the exercise of tact in this connection. The extension of the authority and field of engine foremen to include the handling of train men seems unnecessary and in the discussion of this paper fault will probably be found with its author in this respect. While there may be reasons for believing that train as well as engine crews might receive instruction from an expert locomotive man, yet there seems to be so much that may be done among the engine crews as to require all of the time of this officer and it is believed that the co-operation between the departments might better be had in other ways and through higher officers.

SUBJECTS FOR THE MASTER MECHANICS' CONVENTION FOR 1897.

The list of subjects for report at the Master Mechanics' Association convention next year which appears elsewhere in this issue gives promise of interesting information and discussion. Five out of twelve of the subjects are continued from this year and from these good, well digested results may be expected with particular reference to the subjects of exhaust nozzles, counterbalancing and the apprentice system. Among the other subjects the most important is the eighth on the list concerning the ratios of grate area, heating surface and cylinder volumes. There is no more vital question than this in locomotive designing and perhaps none in regard to which there is greater difference of opinion among designers. The question before this committee is the ratios of grate and heating surfaces for engines in both passenger and freight service and whether burning anthracite or bituminous coal. Put in the terms of the circular it is "What should be the ratio of grate area to heating surface and to cylinder volume?" An incidental subject is the proper ratio between the diameter of the cylinder and the length of the steam ports. It is evident that the committee has an abundance of work on its hands especially if the solution is sought through experimental comparison of locomotives with different ratios between these factors. It is hoped that the opportunity will be offered for such comparison for this seems to be the only possible way to obtain definite conclusions from which to judge as to the best proportions for any given conditions. There is at present very little definite information upon this subject. It is held by some that the falling off in evaporative efficiency of boilers when forced beyond a certain degree is due to faults in combustion of coal and upon this the advocates of small and of large grates contend with no positive solution of the problem in sight. There are arguments on each side which must be considered as strong and logical and the unfortunate feature of the contention is that no one knows who is right.

It is perfectly evident that the heat absorbing functions of a locomotive boiler must be considered as well as those which produce the heat and that the committee is organized with a view of treating the whole subject is evident from the way in which the work is outlined in the circular. Attention has already been called to the fact that during the past year two locomotives have bought out on neighboring roads running into Chicago, for every similar service and running in the same section of the country. These have exceedingly different proportions of grate areas and heating surface. The new designs on the Chicago, Burlington & Quincy and the Chicago & Northwestern Railways are referred to. In these we have an example of the widest difference of opinion, with respect to these items which can be called to mind as applying to conditions which may be considered at all similar. The total heating surface of the Chicago & Northwestern engine is 1903.7 square feet, and the grate are a 26.96 square feet against a total heating surface of 1580.1 square feet, and a grate area of 44.47 square feet of the Chicago, Burlington & Quincy design. As has been pointed out in these columns these cannot both represent the best proportions for the given conditions and since the locomotives of one of the designs are located convenient to a testing plant and the other one is not far away it would appear to be easy to settle the matter by tests. A comparison on an unquestionably fair basis would be likely to produce results from which the whole world might reap benefit. Possibly the ideas has already been considered by the committee and as the combination of gentlemen selected to serve upon it is a particularly strong one it seems probable that the problem will yield much interesting and valuable information.

The questions of the proper metal for cylinders, valves and valve seats, the most economical material for boiler jackets and the availability of piece work for locomotive shops are practical and offer possibilities for considerable improvement with a view of economy. It is well that the matter of shop motors should not be slighted, and investigation of the merits of different systems of power transmission will have the effect of calling attention to the distribution of power as an item of importance. It is perhaps not too much to say that this subject is often considered as one which requires no special attention and it will be well to show that this is a most excellent field for the best engineering thought. Much is expected from the further discussion of nearly all of these subjects and a useful and interesting meeting is predicted.

APPRENTICESHIP.

II.

Last week the apprenticeship rules of the Union Pacific Railway were reproduced, and in commenting upon the apprenticeship system in general some notes from European practice were mentioned. It seems appropriate now to call attention to some of the features of both systems. As early as 1852, the necessity for organizing an apprentice system was appreciated upon the Eastern Railway of France, and after fifteen years eighty-five apprentices were undergoing instruction and the number rose constantly until in January of this year there were two hundred and thirty-eight of them. Space does not permit of describing the foreign systems more in detail, but it is evident that the experience gained in Europe is satisfactory for conditions obtaining there. One thing specially noticeable in the foreign systems is the careful attention given to methods of instruction and there are a few cases of roads upon which the boys are permitted to spend a year or so in doing such work as heating rivets, and this probably

accounts for the success of the instruction. Keeping boys upon work of this character for a longer time than necessary is entirely unfair to the apprentices and, as has well been said by a contemporary, the boys "go into the shop to work for a certain number of years for a compensation which is to be paid partly in cash but mostly in knowledge. If the opportunity of acquiring the latter has been denied them they have not been fully paid, even if the cash part of the pay has been forthcoming regularly. And if the employer who keeps a boy on a bolt cutter, or a drill press, or doing the lower grades of work about a shop until most of his time has been spent, considers he is just in his treatment of the boy, or has put money in his own pocket, he is mistaken. He has not only been unfair to the apprentice, but he has actually failed to benefit by his services as much as he might. This class of apprentices who learn a trade and work at it for life are the most numerous class, and employers are interested in improving their facilities and opportunities for acquiring knowledge."

The dual object of establishing apprentice systems should not be lost to sight. That which contributes to the better education and preparation of the workmen has a return for the employer which is measured in the satisfactory product and in the improvement in processes. The twofold character of the question is recognized by the preamble to the Union Pacific rules wherein it is stated that the code is established to promote the interests of the men and to improve the standard of excellence. An unnecessary long term at any one machine is not compatible with such an object. One of the prime requisites of the satisfactory instruction of mechanics seems to be a definite outline or plan such as is constituted by the code referred to. The regular blank application and release forms seem equally necessary to a definite understanding between the parties and to a realization on the part of the boys of their exact relations with the instructors. The success of any system will depend upon the inducements offered to boys to engage in the necessarily long training and upon the assurance of their receiving in one form or another a value equivalent to that which they give to the employer. The inducements offered for entering into the manufacture of specialties wherein by piecework high wages may be obtained, are making it more difficult to induce boys to stick to four years of training, and for this reason great care should be used to be honest with apprentices. It is fitting that preference should be given to the sons of employes who have given long and faithful service and also to the sons of those who may be killed or injured in the service of the company. This should apply only to the admission to the privileges of apprenticeship and obviously there is no ground for advancement permissible in these rules except that of efficiency, which is applied throughout the course.

For admission as an apprentice, the candidate should show an aptitude for the business and a settled personal desire to become a skilled and competent workman. A provision for dropping any applicants after having shown that they are not adapted to the work which they have undertaken is a wise one, and it is noteworthy that the rules provide a means whereby a boy may be dropped after three months trial during which time he is placed in the probationary class. Physical and mental ability are of equal importance with aptitude, and an examination of the rules will show that neither of these features have been neglected. The requirements outlined in in the rules are formidable in appearance but for self-protection they seem necessarily so. The educational requirements seem high and yet they are very practical and cover only important subjects. Success in passing these examinations would indicate much more than ordinary intelligence on the part of the boys and those having the necessary application to study and pass them can be counted on as promising material for skilled workmen, and later for foremen and higher positions.

There were evidently other rules in force before this code went into effect, and the care with which the new arrangement was made is indicated by the paragraph which concerns the effect of the rules on the existing prices paid for apprentice labor. The new prices were arranged so as to work no reduction in pay in any case and so as to give the boys a promise of increasing wages according to the time spent in the service. For the maintenance of discipline a change was required from the ancient method of indentured apprenticeship, which permitted of terminating the arrangement with any individual by dismissal if thought necessary. No officer below the superintendent of motive power is given authority to act further in this direction than to suspend an apprentice, final disposition of discipline cases being reserved for that officer. It is apparent that every inducement is offered to boys to improve themselves mentally, and special educational advantages are offered for good work at the second examination. Upon leaving the service a certificate of service giving the character and ability of the apprentice is issued and these are sought after as a prize worthy of attainment. This should be a strong inducement to enter the service. No guarantee is given of length of service, but the number of apprentices accepted is regulated with a view of giving them all steady employment. These rules are commended for the attention of all who are interested in this subject, and the experience of Mr. McConnell, who has given much attention to the management of men, will probably prove helpful to any who may be arranging to give more attention to this subject. The announcement has just been received of the subjects for the next convention of the Master Mechanics' Association, and the committee of last year is continued to report recommendation for shop as well as technical training. It is obvious that members having such experience as that herein referred to can be of great assistance to the committee in its work.

THE AMERICAN SOCIETY OF RAILROAD SUPERINTENDENTS.

Twenty-Sixth Meeting, International Hotel, Niagara Falls, Sept. 9, 1896.

The meeting was called to order at 10 a. m., by President Chas. B. Price of the Allegheny Valley Railway, about 50 members being present. The president congratulated the association on the apparent success of its new departure and regretted the absence of Mr. John B. Milburn, of Buffalo, who was expected to address them. The executive committee's report was then read which approved of the new policy of the association and made some recommendations.

The treasurer, R. M. Sully, then followed with his report showing a balance on hand of $1,311.66 a year ago. There was paid in during the year $1,467.10, making a total of $2,778.76. Paid out in vouchers during the year $1,408.85, leaving a balance on hand of $1,369.91. The report of secretary C. A. Hammond was then read. It showed that there were 214 active, 18 associate and 5 honorary members, making the present membership 237, a gain of 12. There had been collected during the year $1,467.10, and expended $1,408.85. The balance turned over to the treasurer was now $1,369.91, a gain of $58.25. The secretary congratulated the association on its healthy and prosperous condition and its work towards the best common practice and the benefits of acquaintance. All had great responsibilities and the interchange of views was very valuable. In a little review of his seven years of secretaryship he showed that at the

18th	meeting,	171	members,	28	attending.
19th	"	116	"	35	"
20th	"	170	"	38	"
21st	"	194	"	40	"
22d	"	194	"	29	"
23d	"	285	"	24	"
24th	"	249	"	33	"
25th	"	225	"	29	"

He spoke feelingly of the death of three members: John Adams, formerly of Fitchburg Railroad; Wm. G Wattson of the West Shore; Waterman Stone, secretary of the association for its first eight years, and paid touching tributes to their memories and characters. Committees on resolutions were then appointed.

The following persons were elected to membership:

A. Mitchell, superintendent, Wyoming division, Lehigh Valley.
Alonzo P. Blakeslee, division superintendent, Lehigh Valley Railroad.
L. H. Van Allen, division superintendent Lehigh Valley.
O. O. Esser, superintendent P. & N. Y. division, Lehigh Valley.
A. B. Newell, superintendent western division, Lake Shore & Michigan Southern.
G. L. Peck, superintendent, P. C. C. & St. L.
H. R. Stoughton, division superintendent, Central Vermont.
C. S. McManus, superintendent transion gin, Joliet & Eastern.
M. Trump, assistant superintendent, Pennsylvania.
W. H. Potter, superintendent, Pennsylvania Co. (L. W. & S.)
J. B. Stewart, division superintendent West Shore.
J. W. Leonard, general superintendent lines east of Montreal, C. P.
T. J. Kennedy, division superintendent, Canadian Pacific.
E. C. Means, superintendent Ashland C. & I. Co.
G. A. Goodell, division superintendent B. C. R. & N.
Geo. Collins, general superintendent and secretary, Central Ontario.
H. H. S. Handy, superintendent Winston & Salem division, Norfolk & Western.
F. G. Williamson, traffic superintendent, Costa Rica Railway.
A. H. Smith, division superintendent, L. S. & M. S.
C. G. Waldo, general superintendent, C. H. & D.
W. H. Palmer, general superintendent, Guatemala Western.
A. L. Mills, general superintendent, T. St. L.& K.C.
Charles O. Haines, supt. and chief engineer, Atlantic & Danville.
W. L. Blair, division supt., N. Y. C. & St. L.
A. E. Robbins, C. H. V. & T.
Chas. W. Chevalier, C. H. V. & T.
J. B. Flanders, supt., C. J. & M.
John P. Heindell, div. supt., W. N. T. & S.
Russell Harding, asst. gen. supt., Great Northern.
C. W. Luce, gen. supt., Detroit & Mackinac.
H. E. Parker, supt. terminal, C. & O.

HONORARY.

Maj. E. D. T. Myers, president American Railway Association.
H. H. Vreeland, president Metropolitan Tract. Co., New York.

ACTIVE.

C. T. Dabney, supt., W. N. Y. & P.
Geo. F. Gardner, supt., B. R. & P.
Tracy W. Niles, supt. Buffalo div L. S. & M. S.
W. A. Garrett, supt. western div., Wabash.
J. B. Marston, supt., D. L. & W.

ASSOCIATE.

H. F. Baldwin, C. E., engineer m. w., Erie.

List of members present:

James Donnelly, Lehigh Valley.
Alonzo P. Blakeslee, Lehigh Valley.
O. O. Esser, Lehigh Valley.
H. D. Titus, Lehigh Valley.
J. F. Maguire, Erie Railroad.
Thos. A. Roberts, Renova Railroad.
Seely Dunn, L. & N. R. R.
C. B. Price, A. V. Ry.
John F. Devine, A. C. L., South of Walden.
E. E. Loomis, Erie Railroad.
L. H. Van Aller., Lehigh Valley.
C. H. Ketcham, West Shore Railroad.
R. Bell, W. N. Y. & P. Ry.
Geo. Van Keuren, Erie Railroad.
Neville Priestly, Indian State Railways.
Rollin H. Wilbur, Lehigh Valley.
G. A. Thompson, Erie Railroad.
H. F. Baldwin, Erie Railroad.
J. H. Carlisle, C. & O.
J. P. Bradfield, N. Y. Central.
C. E. Doyle, Richmond, Va.
W. F. LaBonta, Supt. Ter. C. & O. Richmond.
T. L. Courtney, R. F. & P. R. R., Richmond, Va.
C. C. Walker, C. & O. Ry. Richmond, Va.
H. E. Parker, C. & O. Ry., Newport News.
G. R. Brown, Fall Brook Railway.
A. M. Hawkins, N. & O. Norfolk, Va.
C. A. Brunn, Erie Railroad.
W. L. Derr, Erie Railroad.
Tracy W. Niles, L. S. & M. S.
R. M. Sully, A. C. L., Richmond, Va.
C. A. McAlpin, N. Y. N. H. & H.
Wm. Merritt, Boston & Maine.
J. K. V. Agnew, Chic. & West. Mich.
E. A. Gould, Wabash Railroad.
W. F. Potter, Flint & Pere Marquette Railroad.
C. R. Fitch, Erie Railroad.
E. E. Knibloe, Buffalo.

In the report of the standing committees the first was that of the committee on roadway, with Mr. Seeley Dunn, chairman. This report will appear hereafter.

R. M. Sully thought the committee should investigate and report on the chemical preservation of cross ties and gather such statistics as it could. The president hoped the paper would be discussed.

Mr. Roberts of the Pennsylvania Railroad thought tie plates yet in the experimental stage. Rail braces were a nuisance.

Mr. Derr, Erie, used many hundred thousand servis plates with good results. They should not be too thick. He would use them on every tie on curves and every other on tangents. Mr. R. M. Sully thought that spikes used through tie plates lost part of their holding power. Mr. Derr replied that the tie plate offset that.

Mr. C. A. Hammond said that only long experience could settle these matters. Thick plates were better for yard practice.

Mr. T. A. Robinson thought tie plates were necessary to preserve ties now that good timber was growing scarce. All needed to test them for years. Mr. Hammond had found Lehigh Valley curves on tie plates very smooth.

Mr. Baldwin thought shoulder plates unnecessary on tangents and even questioned their need on curves. Report accepted.

Report of the committee on machinery was then called for. Mr. W. F. Potter, chairman F. & P. M. pleaded neglect and said the committee was, he thought, unnecessary, as the mechanical tended to that subject thoroughly. He would say a word about the locomotive fire kindlers, which saved about 8½ cents per engine and were useful. The committee therefore substituted a brief report on electricity which was accepted.

Mr. Hammond thought something was coming in that line as expressed by the committee.

Electricity must be separated further from coal and power houses. The present electrical conditions were only suggestive. Electrical roads were now tied to power houses every few miles and this must be changed. It will be a long time before locomotive engines will go to the scrap heap and many refinements in electricity must still be made.

Mr. Niles, L. S. & M. S., thought such a change a long distance off. The motors of to-day were not powerful enough.

The report of the committee on transportation was next called for. It was sent by Mr. Whittlesey chairman and was read by Mr. Nibloe. It was very short, merely saying that circulars had been sent and 52 replies received. Of these 22 were loading cars by the tonnage method. It was shown that large savings could be made by the tonnage system of loading trains, avoiding overloading. From 12 to 15 per cent was saved, and the committee recommended this system. The report was accepted.

Mr. Brunn, of the Erie, had found excellent results from use of this system. They could haul as many as 40 cars at a time under this system. They now looked for tons in a train instead of cars. It also helped the running of empty cars and worked generally well.

Mr. Nibloe said that the economy of this system was so great that railroads could afford to put in more track scales in order to use it. A train should be kept down to a safe length for the crew, regardless of the stencilled weight of cars and loads in the aggregate.

Mr. Fitch, of the Erie—Tonnage and trains were an experiment, and it took a dynamometer car to tell how much their engines would haul. A few days with the dynamometer car would settle it.

Adjourned at 4:30 p. m to visit the power plant of the Niagara Electric Co. and to take a carriage ride around Goat Island.

AFTERNOON SESSION.

The committee was called to order at 4:30 and the committee on nominations appointed.

The report of committee on signaling, with L. Derr chairman, reported that the best interests of the association would be served by exhibits of the best and most modern signal practices. This they had done and he would introduce Mr. Chas. Hansel, vice president and general manager National Switch & Signal Company of Easton, Pa., who had an elaborate exhibit of English, Australian and American practice in block and staff signaling and made a long talk on the subject, including a very interesting paper, which we shall publish next week.

Mr. Hansel's paper was listened to with much interest and he was warmly applauded. He was followed by Mr. J. G. Schrender, M. E., chief engineer of the Union Switch & Signal Company of Swissvale, Pa., who explained the workings of a handsome model of the Union company's electric automatic single and double track block system, which was very interesting.

The convention then adjourned until 9 a. m. of the 10th.

The convention had a most interesting visit to the Niagara Power Company's plant where the members were shown everything, including a trip 150 ft. underground to the turbine wheels which furnish the power.

SECOND DAY'S SESSION.

The convention was called to order at 10:30 a. m. Committee on resolutions reported on the deaths of Messrs. Adams, Stone and Wattson and it was spread on the minutes.

Mr. Dunn moved an amendment to the constitution of Sec. 6, Art. 5, leaving out the words: "The members shall be, as far as possible, from the same vicinity." Also a change as to the mode of selecting places of meetings. Under the rules these went over a year.

Mr. Potter (F. & P. M.) thought the association should stick more closely to questions of daily interest to superintendents and leave many other subjects to the other associations. They should not waste their time.

The report of committee on signaling was then taken up and Mr. Neville Priestly of the Indian State railways spoke of their practice. He said they used home and distant signals at only a few large stations, their traffic scarcely warranting much more.

Mr. W. L. Derr (Erie R. R.) spoke of the practice on the Erie in protecting stations, cross-overs and grade crossings. Their engineers could run quite up to the home signals when at danger but never beyond it.

Mr. Brunn (Erie) described his practice of never letting a following train into a block until the engineer was informed exactly where the leading train was.

Mr. Price (A. V. Ry.) said they had two short yard sections equipped with the device shown by Mr. Schrender and they worked well. He wished their whole yard was protected the same way.

Mr. Trump (P. R. R.) said such signals were sometimes affected by wet weather.

Mr. Schrender (U. S. & S. Co.) being given the floor answered many questions about his system.

Mr. Hansel (Nat'l S. & S. Co.) explained a new caution and home signal whereby two signals were operated by the same shaft.

Mr. Hansel was elected an associate member of the association.

Discussion closed. Then followed the general discussion on the report of the special committee presented to the society at its last annual meeting on the relations between railroads and their employes, including methods of training and discipline. The discussion was very general and participated in by many. This was all supplementary to the matter found on page 31, proceedings of 25th meeting.

Mr. Brunn moved that the president be authorized to add six auxilliary members to each committee. Carried.

The report of the nominating committee was then read and the following were elected:

First Vice President, W. F. Potter, F. & P. M. Ry.
Second Vice President, G. R. Brown, Fall Brook Ry.
Executive Committee, 2 yrs.—C. A. Brunn, Erie R. R.; Ralph Peters, Penna. R. R.

STANDING COMMITTEES.

Committee on Roadway.—Seeley Dunn, C. A. McAlpin, T. O. Roberts.

Committee on Machinery.—J. K. V. Agnew, H. A. Hitt, A. W. Johnston.

Committee on Transportation.—T. F. Whittlesey, C. E. Doyle, C. R. Fitch.

Committee on Signaling.—W. L. Derr, C. H. Ketcham, H. D. Titus.

The meeting then adjourned.

The annual banquet on the evening of the 9th was a great success, about 100 being present. There were many good speeches. The usual vote of thanks was given to all who had incurred the obligations of the society.

At 2 p. m. on the 10th an excursion was had down the new Gorge road, on the American side of the falls, past the rapids and whirlpool to Lewiston, by the courtesy of the president of the road, Mr. J. M. Brinker, returning by crossing the Niagara river at Lewiston to Queenstown, on the Canadian side, and thence along the hights, via the Niagara Falls, Park and River Electric Railway, back to the Canadian falls. The views of the surrounding country from this line were much enjoyed.

SHOP NOTES—UNION PACIFIC RAILWAY.

Since the application of compressed air has become so general in locomotive and car repair shops, new methods of obtaining advantage from this useful agent are looked for as one of the greatest lines of improvement in visiting shop plants. One is not disappointed in this respect in looking over the Union Pacific Railway shops at Omaha. It is estimated that the use of compressed air in these shops saves labor to the extent of fully $700 a month; and the expense of running the air plant is very slight. The advantages of pneumatic power thus applied have been sufficiently written about and explained. Mr. McConnell has some novel and ingenious adaptations which are not found everywhere and which are convenient and economical.

For operating a small portable forge he uses air through a hose fed under the fire through a jet $\frac{1}{32}$ in. in diameter. Rivets can be heated in this simple contrivance as fast as two men can drive them. Three jets of this size will run an ordinary blacksmith's forge. In the paint shop compressed air introduced through an iron pipe is used for mixing paint. The mixing is done very quickly and effectually. Air hoists and pneumatic tools of various kinds are used everywhere throughout the works. In order that the office itself should not be behind, the letter presses are operated by compressed air. At the scrap piles there is a home made hammer and also a shear, both operated by air.

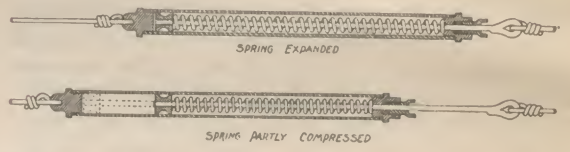
The Union Pacific has effected a net saving of some $10,000 a year by a system of refitting and repairing its air brake material. All of the air brake scrap—valves, cocks, etc.—is brought to the Omaha snops It is there inspected, taken apart, one piece fitted to another, and the "second hand" material thus turned out in thoroughly good condition. High grade scrap of this kind calls for high grade work, but the saving effected is correspondingly great.

Mr. McConnell has entirely abandoned the use of blind tires on locomotive driving wheels. The wheels on which blind tires were formerly used are given $\frac{3}{16}$ in. more play on the track than the outer wheels. It is believed that the cutting of flanges is greatly reduced by this practice. The use of babbit lined eccentrics is also proving very advantageous. Linings used for a year are found to be still in very good condition, and the breakage has been reduced 60 per cent. Driving boxes are also faced with babbit, and wrought iron gibs on cross-heads are found to give excellent results.

A NEW COMPENSATOR FOR SIGNAL WIRES.

The variation in the length of wires used fn operating semaphore signals has been a troublesome matter which has inspired many signal engineers to invent automatic devices for taking up the slack due to warm weather and for paying out during cold weather, so as to keep the connections of uniform length regardless of the temperature. A sketch of a new device for accomplishing this object has just been received from Mr. D. F. Vaughan, supervisor of the Camden & Atlantic Railroad, Haddonfield, N. J. The arrangement is shown in the accompanying illustration.

The principal member is a cylinder made of 1¼ in. brass tubing with suitable end pieces and fitted with a stuffing box, a piston rod, piston and spring, as shown. The piston rod is made of unannealed phosphor bronze and is very strong and not liable to be damaged by corrosion. The cylinder is filled with glycerine before the end plug is finally screwed in, which prevents any rapid movement of the piston, and has the effect of making the compensator pull as a practically solid unit in the line of signal wire when signals are being thrown: but as a slight leakage is provided past the piston, it will travel out or in very slowly, but still fast enough to provide for any contraction or expansion of the wire, caused by changes in temperature. The glycerine in this operation passes slowly from one side of the piston to the other. In use the compensator is put into the line of a signal wire at any convenient point and in any convenient location but preferably in an upright position at the base of a signal pole, or if at the signal tower it should be placed in the basement under the levers operating the wire to be compensated.



If put into the line of wire on an extremely hot day when the temperature is near the maximum, the wires would simply be made taut, leaving the compensator practically as shown in the upper figure with the piston and spring in position to provide for the contraction of the wire when the temperature falls; in such a case, with the maximum temperature it is of course unnecessary to provide for any further expansion. If the temperature is about 60 deg. when the compensator is put in, the wires should be tightened up slowly until the piston rod has been partially drawn out and spring partially compressed as shown in the lower view, in which position a further fall of temperature will further compress the spring and pay out the wire. A rise in temperature by reducing the strain will allow the spring to open and take up the slack due to expansion of the signal wire. By this means both the front and back wires are constantly kept taut, without undue strain, and always in condition to throw the signal. The total length of the compensator for ordinary use is about three feet, making it very convenient. It also possesses the advantage of cheapness and simplicity of construction. The device has been ptaented by Mr. Vaughan.

THE MASTER BLACKSMITHS' ASSOCIATION.

The action of the Master Car-Builders' and Master Mechanics' Associations at the conventions in June of this year,indorsing the work of the Master Blacksmiths' Association and recommending that facilities be offered the members of that organization to attend the annual meeting, have borne fruit in a large attendance and a satisfactory convention which was held in Chicago, Sept. 1, lasting three days. It will be remembered that Mr. J. N. Barr offered the motion referred to before the Master Car-Builders' Association and spoke very warmly of the associations like those of the blacksmiths, the boilermakers and the car painters. At the recent convention in Chicago the attendance was large and 32 new members were admitted. The opening address was delivered by Hon. George B. Swift, mayor of Chicago. The reports of the officers of the association showed it to be in a satisfactory condition as to finances and membership. The number of members is 150, and the treasury balance over $160.

In his annual address, the president spoke of the comparative youth of the organization and the work which has been accomplished by it. He urged the members to make the best possible use of the opportunities offered by the convention and recommended strongly that they should avail themselves of every opportunity to visit one another's shops for the purpose of improving their own work through knowledge of what others were doing. The reports of the committees were instructive and in several instances created lively discussions. That in regard to forges and tuyers recommended the use of blast entering the fire from the bottom of the forge through a square iron blast box, provided with an opening in the top to which a cast iron grating is fitted, having from one to four ⅜x2 in. oblong holes. The object of the blast box is to provide a space into which cinders may fall and from which they may be removed through a slide.

TIE PLATES.*

The report on the best method of manufacturing axles specified that a good reverberatory furnace was required, together with clean coal, good scrap and satisfactory equipment of tools. Old arch bars, bridge plates and rods, and old axles of small size were preferred as material. This should be cut into lengths of eighteen inches placed upon piling boards of the same length and the piles should be from ten to twelve inches wide. The scrap should be carefully cleaned. To the scrap should be added muck bar iron or its equivalent in the form of splice bars, fish plates, etc., which should be used in the proportion of about thirty per cent to each pile. The reason for manufacturing muck bar axles which is practiced by many roads was commented upon in the report and the difficulty in obtaining scrap free from steel was pointed out. This operated against the manufacture of good scrap axles.

The committee reporting upon the best method of constructing and repairing locomotive frames urged the necessity of using good material to start with, the selection of the scrap being the most important item of the work. The next point is the manipulation by the heater, good sound judgment being required. This also applies to the hammer man, who should handle the iron as quickly as possible while at the welding heat. A heavy hammer was preferred for shingling purposes. A small number of welds was recommended, and the frame limbs and braces should be forged under the hammer. After dealing in detail with methods of welding the report closed with the consideration of repairing fractures. Other subjects were treated by the convention which are not mentioned here for lack of space, but the most important were selected.

The committee finds that tie plates certainly hold the rail to the gage. They prolong the life of soft wood ties from mechanical decay or wear five or six years, and hard wood ties two to four years. They are invaluable on curves. A spike has a better support when used with the tie plate than without, as the tie plate gives the spike the required backing.

Practical experience has shown that any form of tie plate to be successful must unite itself to and become part of the tie. Designs of tie plates which fail in this particular feature have invariably proven unsuccessful. Most of the tie plates offered cover this feature, but some of those on the market fail entirely in this regard, and your committee are unable to see where they are of any practical service.

The committee notes that there are three factors working in conjunction with tie plates, the tie, the rail, and the spike. In the rail, the wave action causes an alternate rise and drop to a bearing on the tie plates and thence to the ties; this results in a jumping movement of loose tie plates if the imbedment is not firm and thorough. This loosening indents the ties, breaking or bending the tie plates, and causing a lamination of the rails. Where the tie plate fails in the imbedment and causes the above results the remedy adopted by the manufacturers seems to have been to increase the thickness of the plate, which does not prevent the undulation of the rails but adds a heavier plate, and while the tie plates are saved, the rail receives increased wear, spotting and spoiling them.

n an experimental test made by the Pennsylvania Railroad in 1870 of a flat plate 6 in. square and ⅜ in. thick acted as an anvil and caused the rail head to show a spot where the wheel struck it immediately over the tie plate These plates were not imbeded in the tie and possessed none of the mechanical qualities for imbedment of any of the tie plates now on the market. About 1880 the Manhattan Railway had a similar experience with flat tie plates and was obliged to take them out of the track. In fact they had decided to use no tie plates until those allowing the flauges for imbedment came upon the market. It is therefore obvious that any tie plate that has not a good, firm and secure imbedment in timber, is useless.

Every tie plate should be heavy enough to act as a perfect bearing plate under the rail, but where increased thickness is used either the tie or the rail has to suffer. When tie plates unite themselves to the ties a much thinner plate can be used; for such plates partake of the stiffness and strength of the wood which supports them, that is providing the plate has a full and good imbedment. Your committee find in reports received that the wave motion of light section rail is much more severe than of the heavier rails, now being generally used, so that any tie plate found which resisted the action of the former has a reverse of strength and can be safely used with the latter. In connection with the matter of heavier rails your committee wishes to state it is an error to suppose that the stiffer the rails the more severe the wear is on the tie plate or tie supporting them, as we have been informed that on some lines the number of ties used per rail length is reduced when the heavier rails are laid.

Your committee next considered the ties, in connection with the tie plates, and in looking over many cut ties it became evident that most of the wear is due to the moving rail, and even in the softest woods where indentation was to be expected, there was but little appearance of it. It is here that the tie plate proves of the greatest service. It prevents the tie from being cut into by lessening the up and down motion and decreases the lengthwise movement with the result that there is less creeping of rails and little or no wear into the tie, if the tie plate is properly imbedded.

The duty of the spike is to prevent lateral motion of the rail. If imperfect spiking is done this is not accomplished and to accomplish perfect spiking the tie plate should have its holes so punched as to allow a close fit of the spike to the rail flange. Where this is not done trouble is experienced in the wear of the parts,due to the working in and out of the rail against the spikes This, in connection with the up and down movement, causes a wear in the neck of the spike. It is, therefore, most essential that tie plates should be properly punched, and no tie plate should be placed in position unless the tie has been adzed to a true bearing, as we find the principal cause of tie plates buckling has arisen from this neglect, for no tie plate can be a bridge. In connection with this last finding the commiitee have been struck with the fact that many of the tie plate manufacturers are placing a shoulder on the plate, and that said shoulder as now used is of little or no value, for when the spike wears the rail gets loose motion and the shoulder and spike both cut. It appears that if this shoulder were placed the full width of the tie plate it would offer a support for and reduce the strain on the spike with consequent and better results in the line and gage of the rail.

While considering the three important essential parts which enter into the relation of the tie plate, your committee fully understand that the tie itself is the principal factor, and have tried to secure as much data as possible as to results obtained with different woods used with and without the tie plate. The consensus of opionion seems to be that the life of the cedar tie averages 12 or 14 years, hemlock ties 5 years, tamarack ties 6 years and oak ties 9 years. The price of ties is so variable in different sections of the country that your committee finds it hard to strike the average cost, yet in all the reports we have received the invariable answer has been that where the tie plate has been used, no matter the quality of the tie, it has prolonged the life of the timber from mechanical wear. Better results have been obtained from a narrow than a wide tie plate and a plate five inches wide is ample for all purposes.

As to the question, "Will the use of tie plates dispense with the use of rail braces?" your committee, after a most thorough and searching experiment and investigation, unhesitatingly state that they will do so. We have received reports showing where they have proven successful on curves of 3 deg. and 30 min., 4 deg. and 25 min., 15 deg., and even on 60 deg., where they have held the rail in place without any rail braces being used. Moreover, no lateral movement or cutting of ties has occurred on these curves, and the track is in perfect and true gage.

Your committee has had reports from chief engineers and roadmasters in all sections of the country where ties have been used under almost all possible conditions, with and without plates, and the reports received show that the tie plate is a very necessary appliance on all track work. Its use is economical, as it reduces the repairs on the roadbed and makes a more perfect track with consequent reduction on repairs of rolling stock. Further, its use as a measure of safety is beyond question, for it means truer gage to the track.

Your committee is all unite in recommending the general use of the tie plate on all repair and construction work, and feels that its added cost to the track maintenance will be more than compensated by the cost of labor saved in tie renewals alone.

B. BLACK,
J. B. MOLL,
GEO. W. LIGHT,
Committee.

*Read at the Roadmasters'Convention at Niagara Falls.

Poor's Manual.

The 29th annual number of Poor's Manual of Railroads—edition of 1896—is now ready for delivery. Poor's Directory of Railroad Officials which has been for the past 10 years an auxiliary and supplementary publication to the manual is this year merged into that standard work, and the two issued in one comprehensive volume, thereby covering in the most thorough manner the entire field of railway statistics, history and finance, in which for 29 years the manual has been the undisputed and unrivalled authority. In 1893 Poor's Handboook of Investment Securities was consolidated with the manual, thereby extending the scope of this standard authority to cover state and municipal investments, industrial securities, and as a result the manual this year covers nearly 1,900 pages, embracing statements of 4,399 corporations, as follows:

2049 steam railroad companies,capitalization		$12,400,000,000
1208 street railroad companies,	"	1,375,000,000
143 industrial corporations	"	1,500,000,000
1008 states, counties, cities, towns, etc., debts,		1,200,000,000
Total aggregate investments		$16,475,000,000

Compared with the other material interests of the country, the railroad interest is by far the most important of all. With this great interest the financial interests of the country have become indissolubly linked. Hence it is that the manual is regarded in all financial circles of this and foreign countries as a work indispensable in the ordinary transactions of business life. The manual presents this year the feature of great detail and labor in the statements of the principal companies. These statements, it is believed will prove of unusual public interest. It is, of course, of great value to those interested to have the affairs of all companies set out in one volume and so wide publicity given. The labor and expense involved in the publication of a report of a single company will well illustrate what is involved in the publication of the manual containing statements of more than 4,000 companies.

POWER REQUIRED FOR WOOD WORKING MACHINERY. TESTED ELECTRICALLY.

The following report of electrical tests upon the power required for running woodworking machinery was made by Prof. O G. Dodge, U.S.N., the work having been done at the navy yard at Washington. D. C. It should be borne in mind that a watt is a volt-ampere and equal to $\frac{1}{746}$ of a horse power. An electrical horse power is equal to the product of the current in amperes and the difference of potential in volts divided by 746. One horse power equals 746 watts, which is the equivalent of 33,000 foot-pounds per minute. The results are reproduced from The Electrical Engineer.

In the case of the following tests the mechanical horse power delivered by the motor was determined by tests made under the same conditions as the previous power tests. This was necessary, as in many cases long leads were run to the motor and the drop was large. In other cases it was necessary to use a rheostat in series with the armature to obtain the required speed. Under these conditions the efficiency of the motor was a variable factor, and a separate test was made in each case to determine the output of the motor. The column of mechanical output is therefore the proper one to use in determining the motor required, and the electrical horse power to be delivered by the generator. The work done is the heaviest required of these particular machines.:

Circular rip saw, 28 in. diameter; speed, 1,200 revolutions per minute, or 8,890 lineal feet per minute. Arbor pulley, 5¼ in. diameter by 8½ in. face; hand feed; motor belted to saw shaft: Motor and saw, idle, 3.4 e. h. p.; ripping seasoned heart oak, 7⅝ in. thick; feed, 10 ft. per minute, 19.3 e. h. p.

Circular rip saw, 34 in. diameter;speed, 1,500 revolutions per minute, or 9,429 lineal feet per minute; hand feed; motor belted direct to 7 in. pulley on saw shaft: Motor driving saw, idle, 3.2 e. h. p.; ripping seasoned heart oak, 6 in. thick, 10 ft. per minute, 12.8 h. p.; ripping seasoned white pine, 6½ in. thick, 15 ft. per minute, 9.4 e. h. p.; ripping seasoned yellow pine, two inches thick, 45 ft. per minute, 10.7 e. h. p.

Circular rip saw 14 in. diameter; speed 2,200 revolutions per minute,or 8,067 lineal ft. per minute; Arbor pulley 3 in. diameter, 5 in. face; hand feed; motor belted to saw shaft; motor, idle, .96 e. h. p.; motor and saw, idle, 2.7 e. h. p.; ripping seasoned heart oak, 3½ in. thick, 12 ft. per minute, 6.3 e. h. p.

Circular rip saw, 12 in. diameter; speed 2,200 revolutions per minute, or 6,914 lineal feet per minute; hand feed; belt pulley 3⅛ in. diameter and 3 in. face; motor belted direct to 3½ in. pulley on saw shaft; saw set to wabble for cutting grooves: Motor, idle, .96 e. h. p.; driving saw, idle, 2.2 e. h. p.; cutting groove in seasoned walnut, ⅜x⅜ in., 12 ft. per minute, 3.6 e. h. p.

Band saw pulleys 72 in. diameter; speed, 160 revolutions per minute, or 3,017 lineal feet per minute; belt pulley 30 in. diameter, 8 in. face, power feed; motor belted to saw shaft: Motor and saw, idle, 12.1 e. h. p.; ripping seasoned ash, 10¾ in. thick, feed 6 ft. per minute, 16.1 e. h. p.; ripping seasoned white pine, 16½ in. thick, feed 10 ft. per minute, 16.1 e. h. p.; ripping yellow pine, 12 in. thick, 20 ft. per minute, 18.8 e. h. p.

Band saw, pulleys 42 in. diameter; speed 350 revolutions per minute or 3,850 lineal feet per minute; belt pulley 16 in. diameter, 5 in. face; hand feed; motor belted to saw shaft: Motor, idle, .96 e. h. p.; motor and saw, idle, 2.9 e. h. p.; ripping seasoned oak, 12 in. thick, feed 3 ft. per minute, 5.7 e. h. p.; cross cutting seasoned oak,8 in. thick, feed 5 ft. per minute, 5.7 e. h. p.; ripping live oak, 10 in. thick, feed 3.2 ft. per minute, 5.7 e. h. p.

Band saw pulleys, 28 in. diameter; speed 480 revolutions per minute, or 3,520 lineal feet per minute; belt pulley 12 in. diameter, 3½ in. face; hand feed; motor belted to saw shaft: Motor, idle, .96 e. h. p.; motor and saw, idle, 1.7 e. h. p.; ripping seasoned oak, 3 in. thick, feed 2½ ft. per minute, 2.3 e. h. p.; ripping seasoned pine, 3 in. thick,feed 4 ft. per minute, 2.3 e. h. p.; cross-cut seasoned oak, 3¼ in. thick, feed 4 ft. per minute, 2.3 e. h. p.

Daniel's plainer, machine bed 2 ft. 5 in. by 21 ft. 6 in.; belt pulley 13 in. diameter by 5¼ in. face: speed 350 revolutions per minute; speed of cutting edges of tool 10,400 ft. per minute; power feed 12 ft. per minute; motor belted to countershaft: Motor, idle, .96 e. h. p.; driving machine, idle, 3.9 e.h.p.; planing seasoned oak,cut 3-16 in. deep by 20 in. wide, 12 ft. per minute, 6.2 e. h. p.

Hand cylinder planer or jointer, size of machine 24 in.; belt pulley 4 in. diameter, 5 in. face; speed 3,200 revolutions per minute; speed of cutting edge of tool 4,000 ft. per minute; hand feed; motor belted to shaft of tool: Motor, idle., .96 e. h. p.;driving machine, idle, 2.40 e. h. p.; planing white pine, cut 11-100 in. deep by 18 in. wide, 25 ft. per minute, 4 80 e. h. p.

Cylinder planer, size of machine 24 in.; belt pulley 5 in. diameter, 5 in. face; 2,250 revolutions per minute; speed of cutting edges of tool 3,105 ft. per minute; power feed; motor belted to shaft of tool: Motor idle, .96 e. h. p.; driving machine, idle, 2.40 e. h. p.; planing pine, cut 1-16 in. deep, 18 in. wide, 11 ft. per minute, 3.6 e. h. p.; planing oak, cut 1-16 in. deep, 6½ in. wide, 11 ft. per minute, 3.6 e. h. p.

Boring machine, speed of bit 375 revolutions per minute; hand feed; motor belted to bit shaft: Motor, idle .96 e. h. p.; driving machine, idle, 1.7 e. h. p.; boring, 4 in. hole in seasoned oak, 9 3-5 ft. per minute, 2.3 e. h. p.

Boring machine, belt pulley 8 in. diameter, 3 in. face; speed 750 revolutions per minute; hand feed; motor belted to machine shaft: Motor, idle, .96 e. h. p.; driving machine, idle, 1.9 e. h. p.; boring 1 in. hole in oak, feed 3¾ in. in 5 seconds, 2.2 e. h. p.; boring 1⅝ in. hole in oak, feed 1 in. in 7 seconds, 2.2 e. h. p.

Pattern makers' lathe,speed 888 revolutions per minute; motor belted direct to lathe: Motor, idle, .96 e.h.p.; driving lathe, idle, 2 e. h. p.; turning seasoned poplar, 12 in. diameter. ½ in. cut, 3.2 e. h. p.

Carver and molder, speed of tool 5,236 revolutions per minute: motor belted direct to tool shaft: Motor, idle, .96 e. h. p.; driving tool, idle, 2.8 e. h. p.; cutting groove, circular sector, 2 in. wide, ¾ in. deep, 3½ ft. per minute, in white pine, 3.9 e. h. p.

TECHNICAL MEETINGS.

The Engineers' Club of Philadelphia meets on the first and third Saturdays in each month, at 8 p. m., at the house of the club, 1122 Girard street, Philadelphia, Pa.

The Civil Engineers' Club of Cleveland, meets on the second and fourth Tuesdays in each month, at 8 p. m., at the Case Library building, Cleveland, Ohio.

The Association of Engineers of Virginia, holds its informal meetings on the third Wednesday of each month from September to May inclusive, at 8 p. m., at 710 Terry building, Roanoke, Va.

The Western Railway Club of Chicago, holds its meeting on the third Tuesday of each month.

The Central Railway Club meets on the fourth Wednesday of January, March, April, September and October, at 10 a. m., at the Hotel Iroquois, Buffalo, N. Y.

The Denver Society of Civil Engineers meets on the second and fourth Tuesdays in each month except July, August and December, when they are held on the second Tuesday only, at 36 Jacobson building, Denver, Colo.

The Western Society of Engineers holds its regular meetings for the transaction of business and the reading and discussion of papers on the first Wednesday of each month except January.

The American Society of Civil Engineers holds meetings on the first and third Wednesdays in each month, at 8p.m., at the House of the Society, 127 East Twenty-third street New York City.

The Association of Civil Engineers of Cornell University meets weekly every Friday, from October to May inclusive, at 2:30 p. m., at Lincoln Hall, New York.

The Boston Society of Civil Engineers, meets monthly on the third Wednesday in each month, at 7:30 p. m., at Wesleyan Hall, 36 Bromfield street, Boston, Mass.

The Canadian Society of Civil Engineers meets every other Thursday at 8 p. m., at 112 Mansfield street, Montreal, P. Q.

The Foundrymen's Association meets monthly on the first Wednesday of each month, at the Manufacturers' Club, Philadelphia, Pa.

The Montana Society of Civil Engineers meets monthly on the third Saturday in each mouth, at 7:30 p. m., at Helena, Mont.

The New England Railroad Club meets on the second Tuesday of each month, at Wesleyan Hall, Bromfield street, Boston, Mass.

The New York Railroad Club has a monthly meeting on the third Thursday in each month, at 8 p. m., at 12 West hirty-first street, New York City.

The Northwestern Track and Bridge Association meets on the Friday following the second Wednesday of March, June, September and December, at 2:30 p. m., at the St. Paul Union Station, St. Paul, Minn.

North-West Railway Club meets alternately at the West Hotel, Minneapolis, and the Ryan House, St. Paul, on the second Tuesday of each month.

The Engineering Association of the South meets on the second Thursday of each month at 8 p. m., at the Cumberland Publishing House, Nashville, Tenn.

Annual meeting Traveling Engineers' Association, Minneapolis, Minn., Sep. 8, 1896. W. O. Thompson, secretary 415 Marion street. Elkhart, Ind.

Annual Convention Roadmasters' Association and Road and Track Supply Association, Cataract Hotel, Niagara Falls, N. Y. second Tuesday in September, 1896.

The Railway Signaling Club holds its meetings in Chicago, Ill., on the second Tuesday of January, March, May, September and November. G. M. Basford, secretary, 818 The Rookery.

The Southern & Southwestern Railway Club holds its meetings on the third Thursday of January, April, August and November, at the Kimball House, Atlanta, Ga.

The Western Foundrymen's Association holds its meet ings on the third Wednesday in each month, at the Great Northern Hotel, Chicago, Ill.; secretary, S. T.Johnstone, 1522 Monadnock building.

The Technical Society of the Pacific Coast has a monthly meeting on the first Friday in each month at 8 p. m., at the Academy of Sciences building, 819 Market street, San Francisco, Cal.

The Engineers' Club of Cincinnati has a monthly meeting on the third Thursday in each month, at 7:30 p. m. at he Literary Club, 24 West Fourth street, Cincinnati, O. Address P. O. Box 333.

The Engineers' Club of Minneapolis holds its meetings on the first Thursday in each month, at Public Library building, Minneapolis, Minn.

PERSONAL.

Mr. C. W. F. Felt is now chief engineer on the Gulf, Colorado & Santa Fe Railroad with headquarters at Galveston.

Mr. Edward Clarke has been appointed freight claim agent of the Burlington & Missouri River, with headquarters at Omaha.

Mr. Harvey N. Loomis has been appointed general manager of the Trojan Car Coupler Company, with office at 49 Wall street, New York City.

Mr. Wm. Porter has been appointed superintendent of the Baltimore & Ohio Southwestern dining car service. He will also have charge of the commissary.

Mr. B. A. Squire has been appointed contracting freight agent of the Lake Shore at Chicago. He was formerly with the Chesapeake & Ohio Southwestern.

Mr. A. C. Martin has resigned as general agent of the Oregon Railroad & Navigation Co. and Union Pacific at Seattle, Wash., to engage in other business at Portland, Ore.

Mr. H. O. Pond who was for many years connected with the Columbus, Hocking Valley & Toledo road, and was later superintendent of the Columbus, Shawnee & Hocking, has been appointed yardmaster of the B. & O. at Grafton, W.Va.

Mr. T. M. Gilbough has been appointed land and tax commissioner of the Gulf, Colorado & Santa Fe Railroad, with headquarters at Galveston, vice Mr. Thomas W. Jackson, resigned.

Mr. A. D. Shaw, general yardmaster of the Peoria & Eastern, has retired voluntarily on account of poor health. He is now sixty-eight years of age and ranks as one of the oldest yardmasters in the west.

Mr. James Mahoney, who has been general freight and passenger agent of the Mason City & Ft. Dodge since Oct., 1891, has resigned that position. He was formerly assistant general freight agent of the Iowa Central.

Mr. W. A. Wiggins, southern passenger agent of the C., H. & D., who was formerly located at Chattanooga, Tenn., but who has more recently had his headquarters at Cincinnati, retired from the service of the company on the first of the present month. No one will be appointed to succeed him.

Mr. C. W. Forrester, western superintendent of the Union line, operated by the Pennsylvania Co., has issued notice that Mr. John C. Wood has been appointed agent at Indianapolis. The Union line and division freight agencies at Indianapolis will be separated. Mr. S. F. Gray will continue as division freight agent P., C., C. & St. L. Railway.

Mr. Edward Chase who until recently was engineer of the Empire State Express between Syracuse and Albany, will soon take up the duties of traveling engineer on the New York Central on the Middle division, which covers the distance between Syracuse and Albany. Mr. Frank Case who holds the latter position at present, is to be promoted to be master mechanic at Utica.

Mr. A. A. Heard, whose resignation as general passenger agent of the Northern Steamship Co. at Buffalo was recently announced, has secured the position of secretary of the Central Traffic Association, succeeding B. F. Knapp, and entered upon the duties of that office on the 7th inst. Before Mr. Heard entered the Northern Steamship service he was assistant general passenger agent of the Great Northern, and before that he held a similar position with the Missouri Pacific.

Mr. W. W. King, who for the past three years has been traffic manager of the Chicago Sugar Refinery, has resigned his position, and it is understood will accept a prominent position with one of the leading western railroads. Mr. King is well qualified for railroad work. For twenty years he was connected with the great Burlington system, during which time his career was one of steady promotion, until, when he decided to seek other fields, he was regarded as one of the most capable and trustworthy officials in the Burlington's employ.

Mr. W. H. Newman, third vice president of the Chicago & Northwestern has resigned that position to except that of second vice president of the Great Northern vice Mr. W. W. Finley resigned. Mr. Newman is a Virginian by birth and entered railway service in 1869 as station agent of the Texas & Pacific at Shreveport, La. From 1872 to 1883 he was general freight agent of the same road. In June of the latter year he was made traffic manager of Southwestern System lines in Texas and Louisiana composed of the Texas & Pacific, International & Great Northern, Galveston, Houston & Henderson and Missouri, Kansas & Texas roads. This position he held until 1885, when he was made traffic manager of the Missouri Pacific, becoming third vice president of that system in 1887. In 1889 he became third vice president of the Northwestern which position he now resigns.

Upon the resignation of Mr. W. H. Baldwin, Jr., as second vice president of the Southern Railway, Mr. W. W. Finley, formerly third vice president of the road but recently second vice president of the Great Northern, was chosen to fill his place. Mr. Finley entered railway work in 1873, and has been with the New Orleans, Jackson & Great Northern, Chicago, St. Louis & New Orleans,Texas & Pacific division of the Missouri Pacific, Panhandle route, Great Northern, Montana Central and Southern Railways. He has also been chairman of the Trans-Missouri Traffic Association at Kansas City, chairman of the Western Passenger Association at Chicago and commissioner of the Southern States' Passenger Association. Mr. Finley's duties at Washington will be in connection with the operating department rather than the traffic department of the Southern Company.

At a recent meeting of directors of the Southern Railway Company held at Richmond, Va., the resignation of the second vice president, W. H. Baldwin, Jr., was accepted, to take effect Sept. 15. Mr. Baldwin will succeed Mr. Austin Corbin, recently deceased, as president of the Long Island road, will be the youngest railway official holding the position of president in the country, being but thirty-five years of age. He is a graduate of Harvard college of the class of '84. He took up the law, but was persuaded to join the staff of the Union Pacific Railway as division freight agent at Butte, Mont., afterward holding consecutively the positions of assistant general freight agent, and manager Leavenworth division. In 1889 he became general manager of the Montana Union, and for a short time was also president of the same road. For one year—1890 to 1891—he was assistant vice president of the Union Pacific at Omaha. Next Mr. Baldwin became connected with the Flint & Pere Marquette Railway and worked up to be general manager. He was called to help in the reorganization of the Richmond terminal, which was developed into the Southern Railway by Samuel Spencer,then connected with Drexel, Morgan & Company. In the growth of this system it is said that Mr. Baldwin's energy and power as an organizer were conspicuous.

Mr. George B. Sherman, general manager of the Vanderbilt fast freight line died this week at Buffalo, N. Y. The deceased was a few days ago on his way to his office in his carriage when one of his horses became frightened and started to run away. Mr. Sherman jumped out, striking on his left hand and head, bruising and cutting both badly. His wounds were dressed and he was taken home, but his condition from the time of the accident was critical. A daily paper says: "He entered railroad service in 1865, leaving a bookstore in Buffalo to become clerk to D. K. Folsom, who was the agent of the Merchants' Despatch and the American Express Co. In 1868 the two offices were separated, Mr. Folsom continuing as agent of the American Express until transferred to Indianapolis, and Mr. Sherman, with the separation, was made agent of the Merchants' Despatch at Louisville; in 1871 he was appointed Southwestern agent of the company, in 1882 he was promoted to western agent with headquarters at Cleveland; in 1882 he was appointed general western agent of the Merchants' Despatch Transportation Co., with headquarters at Chicago; in 1885, with the consolidation under one management of the Red, the White and the Midland fast freight lines, operating over the Vanderbilt system, he was appointed general manager, in which position he made an enviable record." No successor has been appointed but it is rumored that Mr. Duke Nicholson, general agent of the Red Line at Chicago, will be selected.

This week announcement was made of the death, at Cuyahoga, O., of Mr. Josephus F. Holloway. Mr. Holloway was widely known among engineering and mechanical men and as a member of the various engineering associations he was a quite regular attendant at their meetings, and always had a part in their discussions. In 1884 and 1885 he was president of the American Society of Mechanical Engineers, and for a number of years was a vice president of the American Institute of Mining Engineers, holding that office at the time of his death. While a resident of Cleveland he was president of its Civil Engineers' Club, and afterwards on going to New York he was elected president of the well known Engineers' Club of the Metropolis. Mr. Halloway was a native of Stark county, Ohio, and on showing a mechanical inclination when a boy he was apprenticed to the machinist's trade at Cuyahoga Falls. He finally finished his trade in an eastern shop, then followed a wide and varied experience in Cleveland, Sandusky, Wilmington, Del., Frostburgh, Md., and other places. Early in 1860 Mr. Holloway became connected with the Cuyahoga Steam Furnace Company, Cleveland, as superintendent and engineer, and in 1872 was made president, and in the twenty-seven years of his connection with the establishment it was uniformly prosperous. In 1887 came its transfer to other hands. Then he connected himself with Henry R. Worthington, New York, and has since devoted himself to hydraulic engineering for the last two or three years, being consulting engineer of the Snow Steam Pump Company, Buffalo, N. Y. In all this busy life Mr. Holloway found time to cultivate a decided literary taste and his contributions to the literature of the engineering societies and to engineering journals have been quite voluminous.

RAILWAY NEWS.

Asheboro & Montgomery.—Of the 26 miles of this road, which is really a branch or the Aberdeen & West End, 18 miles are graded and 6 miles of track are laid. The grading done is from Starr toward Asheboro. Mr. A. F. Page, of Aberdeen, N. C., is building the road.

Chicago Great Western.—In addition to extensive improvements and leases of exclusive terminals at Des Moines and Chicago for the Chicago Great Western, it is reported that track will immediately be laid on a new branch running from Dodge Center to Mantorville, Minn., a distance of six miles. Mantorville is famous for its stone quarry, and the new branch will be a valuable addition to the property. It is expected to have this completed by the middle of next month ready for local trains. It is the intention this fall to lay several miles more of heavy steel rail near Chicago, and next season the road will lay 60 miles more. In his last annual report to the shareholders President Stickney called attention to experiments he had been making to demonstrate the possibility of reducing grades for the handling of heavier trains at a cost of $250,000. He proposed such reductions in eastbound grades on the main stem from Oelwein to Chicago, on the southwestern line from Reinbeck to Oelwein, and on the northwestern line from Dodge Center to Oelwein, in all 368 miles. Except on the southwestern line this work is now in progress and will be finished by the middle of next summer, work being conducted all winter. Work has also commenced on an elevator at Kansas City with a capacity of 10,000,000 bushels. This will be one of the largest in the country and no other elevator will excel it in handling capacity. It will have five sets of machinery, and the cost of construction will amount to $200,000. The proposed freight house at Chicago will cost about as much more, and if completed according to present plans will be the largest in the world.

Columbus, Hocking Valley & Toledo.—At a recent meeting of stockholders of the Columbus, Hocking Valley & Toledo Ry. Co. a resolution was adopted authorizing the issuing of $30,000,000 in bonds. This is to refund the $20,000,000 bonds now outstanding and also cover all other outstanding indebtedness. The bonds are to be secured by a general mortgage on all the property of the company; no arrangements have been made to float the bonds. The report has been circulated as the result of the call for this meeting to the effect that the bond issue is to make possible the consolidation with the Flint & Pere Marquette line.

Detroit, Lansing & Northern.—The sale at public auction of the Detroit, Lansing & Northern R. will occur at Grand Rapids, Mich., on October 20, with Mr. John S. Lawrence, master in chancery, as auctioneer. This system is included under three corporations, and the sale which is to foreclose the mortgages will be followed by a reorganization.

Duluth & North Dakota.—The "Farmers" road under the supervision of Mr. D. W. Hines has not of late progressed as satisfactorily as was expected. The directors not quite liking the results of his management have decided to let the obnoxious money loaners of the east have a finger in the business and help them out of the tight place they are in, financially. It demonstrates that eastern capital is necessary to carry on western projects, however much the people of the west may dislike to go east for help. In speaking of this an exchange says; "It is all right to talk about the west being able to take care of itself, but when you come down to the solid facts of the case you will find that the business of the east and the west is too closely interlinked to admit of such a proposition. It is eastern capital largely that has built up and developed the west and more of it is needed to complete the work that was well under way at the time of the panic of three years ago, and which has since remained untouched."

Georgetown & Granger.—The creditors of the Link Line held a meeting September 5 at which it was shown by Captain M. P. Kelly, superintendent of construction, that there was $4 of property for every $1 indebtedness, and that it would be pushed to completion as soon as the present financial depression was passed. It was therefore agreed among the creditors not to push the road into the hands of a receiver, and give the present management a show to settle the matter themselves.

Hoxie, Pocahontas & Northern.—It is said that tracklaying on the new Hoxie, Pocahontas & Northern R. will begin this month. The road is to run from Hoxie, Jasper county, to Pocahontas, Cape Girardeau county, a distance of 15 miles. Connection will be made at Hoxie with the St. Louis, Iron Mountain & Southern and Kansas City, Fort Scott & Memphis. Maxwell Coffin of Little Rock is president of the company.

Jacksonville, Tampa & Key West.—After several postponements the date for the sale of the Jacksonville, Tampa & Key West is again set for the first Monday in October. This sale, which will be made under decree of the United States court, will take place in front of the court house at Jacksonville at an upset price of $350,000. It is thought likely that another postponement will be ordered, as one branch of the case is now pending before the United States circuit court of appeals at New Orleans on appeal from the decision of Judge Locke of the Jacksonville district. Judge Locke will open court at the latter place during the last week of October.

Nashville, Chattanooga & St. Louis.—On September 9 the directors of the Nashville, Chattanooga & St. Louis R. met and ratified the lease of the Paducah & Alabama and Midland Rs. The stockholders also met and heard the reports of officers, but adjourned for 90 days without acting upon the leasing of the two roads mentioned above. The stockholders must ratify or reject the action of the directors.

Ogdensburg & Lake Champlain.—The new bondholders' committee of the Ogdensburg & Lake Champlain road has just issued an address to the bondholders which has been favorably received. The road is leased to the Consolidated Railroad of Vermont, whose receivers have paid the July 1 interest on the Consolidated road's bonds, but have allowed the Ogdensburg & Lake Champlain's interest to remain in default. The latter road has wharves at the foot of navigation of the great lakes at Ogdensburg, and its lines extend thence to a connection with the Central Vermont and Delaware & Hudson Railroads at Rouse's Point. The La Moille Valley Extension Railroad (12 miles long) was originally leased to the Ogdensburg company, and extends from Rouse's Point to a connection with the Boston & Maine Railroad at Swanton Junction. It is proposed to foreclose the first consolidated mortgage bonds of the Ogdensburg & Lake Champlain Railroad Co., and form a new company, which new company may include the La Moille Valley Extension Railroad. Owing to the ownership of a majority of the stock of the Ogdensburg & Lake Champlain Railroad Co. by the Consolidated Railroad Co. of Vermont, the present lease of the Ogdensburg & Lake Champlain Railroad to the Consolidated Railroad Co. of Vermont was practically authorized by the directors of the Consolidated Railroad of Vermont, to the Consolidated Railroad Co. of Vermont. This lease seems a rather unfortunate one for the Ogdensburg & Lake Champlain road inasmuch as it does not covenant to pay the interest on the first consolidated mortgage bonds, and that it authorizes the Consolidated Railroad Co. of Vermont to use net earnings before paying interest on any of the bonds, for the purchase price of any land or property of any kind, by the Consolidated Railroad of Vermont, for any purpose connected with the operation of the Ogdensburg & Lake Champlain Railroad. The agreement of reorganization proposed by the committee provides for a first consolidated mortgage of $4,400,000 and common stock amounting to $4,400,000. The two financial corporations, the Old Trust Co. of Boston and the Central Trust Co. of New York, are authorized to issue negotiable certificates for bonds deposited under the plan.

St. Louis, Oklahoma & Texas.—A dispatch from Tecumseh, Okla., under date of September 5, states that the last spike was that day driven in the section of the St. Louis, Oklahoma & Texas Air Line, which connects Tecumseh with the Choctaw nation, and that the engine and cars arrived the night before and regular trains were to be started Monday.

NEW ROADS AND PROJECTS.

Idaho.—A new railroad to run from Leonia, Idaho, to the Yakt river is about to be begun. It is said that enough money is now on hand to complete the enterprise.

Indiana.—Application has been made in the circuit court at Brazil, Ind., for the appointment of a receiver for the Chicago & Southeastern R. Co., otherwise known as the Midland. The title of the case is Robert McBeth vs. the Chicago & Southeastern R. Co. There are altogether 100 plaintiffs who from time to time have received judgments against the Midland which still remain unpaid.

Mexico.—Grading has begun on the new Rio Grande, Sierre Madre & Pacific road. This road is to extend from Ciudad Juarez in a general southwesterly course via the San Blas mountains, Lake Guzman, Sabinal and San Pedro mining region to the vicinity of Casas Grandes, a distance of 156 miles. The permanent location of the line is now nearly completed. The officers expect to begin laying track in October next. The character of the work is generally light. The bridging will be bent and pile trestles. About 100 men are at work at present, but this number will be largely increased in a very short time. The firms at present holding construction contracts are Gilbert Webb, Juarez, Mex.; Richard Caples, El Paso, Tex.; W. C. Bradbury & Co., Denver, Colo.; Farnsworth, Beck and others of the Mormon Colonies in Mexico, state of Chihuahua. J. Fewson Smith of the railroad is chief engineer, with headquarters at Ciudad Juarez, Mex. The road is being built by the Sierra Madre Construction Co., whose officers are A. Foster Higgins, president; Solon Humphreys, treasurer, and George Rowland, secretary, all of New York.

Missouri.—The Ward Lumber Co. is constructing a railroad line from Campbell, Mo., to Poplar Bluff, a distance of 30 miles. The road will be a connection between the St. Louis Southwestern and the Iron Mountain system. It is to be standard gage and will be used for freight and passenger traffic. About ten miles of the line will be completed this year. Mr. C. A. Ward at Whiting is president of the company.

Texas.—The engineering corps which is to survey the route for the new line which is proposed between Marshall and Jefferson left the former place on the morning of the 8th instant to begin work.

Virginia.—A proposition is being considered whereby a direct line between Norfolk and Portsmouth and tidewater and Louisville will be afforded. Should this be carried out it will be one of the most important pieces of railroad construction undertaken in this section for some time. It is the intention to build an extension of the Lexington & Eastern from its present terminus at Jackson, Ky., to Big Stone Gap, Va., where connection will be made with the main line of the Norfolk & Western R., together with which line the new route to Louisville will be formed. The president of the Lexington & Eastern is quoted as saying that the plans and details of construction will be arranged and work begun at an early date. The extension will be about 102 miles in length.

INDUSTRIAL NOTES.

Cars and Locomotives.

—The Rogers Locomotive Works has taken a contract for three ten wheel locomotives for the Keokuk & Western Railroad.

—The Chicago Rock Island & Pacific has given an order for 100 box cars to the Michigan-Peninsular Car Co.

—It is now stated that the order for 100 refrigerator cars for Swift & Co., which was held up some time ago will be let next week.

—The order recently placed by the Florida East Coast Railway with the Elliott Car Co., at Gadsden, Ala., for 50 flat cars and 300 ventilated box cars, are to be equipped with the Westinghouse brake, Marden brake beams, Tower couplers, American continuous and Butler draw-bar attachments, Detroit springs, and the Moore door, with malleable iron fastenings.

—The Georgia & Alabama Railroad Co. has ordered three passenger and two freight locomotives for the sirvice of its line between Savannah and Montgomery, Ala. The Richmond Locomotive Works, which received the order, has nearly completed it.

—The Northern Pacific car shops at South Tacoma, Wash., are building 120 new flat cars of 70,000 lbs. capacity, to be completed within the next two months.

—The St. Louis Car Co. has secured the contract for 22 of the most modern cars for the new extension line of the Pittsburgh & Birmingham Traction Co. at Pittsburgh, Pa.

—The order recently placed with the Union Car Co. of Depew, N. Y., by the West Shore Railway, for 60 gondola cars 34 ft. long, 8 ft. 6 in. wide, and 50,000 lbs., will have Fox solid pressed steel trucks, Westinghouse air brakes, Central steel brake beams, Gould couplers, Pickering springs, and King side bearings. The order calls also for 168 box and 22 stock cars. The box cars will be 35 ft. long, 8 ft. 10 in. wide, and 60,000 lbs. capacity. The stock cars will be 36 ft. long, 8 ft. ¾ in. wide. The special devices used will be practically the same as on the gondola cars. The stock cars will have a double board roof and the box cars a corrugated iron roof. Both will have sliding doors with Dunham fixtures.

—The Madison Car Works at Madison, Ill., has shut down because of a lack of orders. About 350 men are thrown out of employment. It is not definitely known when operations will be resumed.

Buildings.

—The city architect of Chicago is preparing plans for a large machine shop to be built by the city. Property has been bought on which to erect the building on Ashland avenue, 200 ft. front by 240 ft. deep. Bids for the building will be advertised for soon, and work will be begun by December 1. The idea of constructing the new building is to consolidate the city's repair work and permit the city to dispose of property now being used as sights for repair shops, which has grown too valuable for the purpose. At present the city has two machine and repair shops, one at the foot of Chicago avenue and the other at Eagle and Union streets.

—The Texas Midland Railroad has begun work on station buildings and other improvements on the northern extension recently completed. Contracts have already been given out for five depot buildings; also several section houses.

—The Buffalo, Rochester & Pittsburgh Railway Company proposes to enlarge its station on West avenue at Rochester, N. Y. A large number of other improvements will be made on property which it recently purchased at a cost of $3,000,000.

—The Buffalo, Rochester & Pittsburgh will erect at Du Bois, Pa., new car shops consisting of a mill building 60x200 ft.; engine house, 60x125 ft.; blacksmith and machine shop, 40x50 ft.; storehouse, 48x80 ft., and paint shop, 24x96 ft.

—The Baltimore & Ohio Railroad Company (office Baltimore, Md.) has made a proposition to the city for the establishment of railway shops, at Keyser, W. Va. The city council is considering the proposition. About 100 men will be employed.

—The Midvale Steel Company, Nicetown, Pa., has finished plans for a new foundry of brick and iron, 46x130 ft., one story high and costing about $35,000. The company will also erect a two story pattern store house.

—Mount Royal station, the up-town depot of the Baltimore & Ohio Railroad in Baltimore city, has been opened. The new station is surrounded by parking, which slopes down to the building some distance below the street level. A winding driveway leads to the station, which is a handsome granite structure in the renaissance style of architecture. The central portion of the building is but one story high, giving the waiting rooms very high ceilings. One of these rooms is 66 ft. 9 in. long by 42 ft. wide, and another 44 ft. 3 in. by 42 ft. A gentlemen's smoking room opens into the main waiting room from the south. The laidies' waiting room is at the north end. At the extreme north end of the building is the baggage room. A restaurant for serving light lunches is at the south end. Chief Engineer Manning and his assistants occupy the second floor. A steel train shed 428 ft. long and 80 ft. wide, covering five tracks, is on the west side of the building. The large tower capping the structure contains an electric clock, which is illuminated at night and shows four sides. Work commenced last October on the station and the finishing touches are now being completed. The building cost about $110,000, the train shed nearly $60,000, and the improvement of the grounds over $15,000.

—The Canadian government has decided to expend $50,000 for the erection of a new station at Moncton, N. B., the headquarters of the Intercolonial Ry.

—George W. Knopf, consulting and contracting engineer, has been engaged by W. H. Hamilton & Company to prepare plans and specifications and superintend the erection of a large glass plant to be located near Pittsburgh. There will be four large furnaces. The factory building will be 151x275 ft.; grinding and packing house, 45x230 ft.; warehouse 93x200 ft. The warehouse and factory building will be of steel frame construction clad with corrugated sheets. The grinding and packing house will be of brick and steel.

—Property recently purchased by the New York, Philadelphia & Norfolk Railway Company at Norfolk, Va., aggregates 40 acres, including 1000 ft. front on harbor. It is stated that the company will use this property for terminal purposes, and intends constructing piers and wharves, if not warehouses, in the near future. It is also understood that the Southern Railway Company has determined to erect the cotton compress, which it has been considering for some time past near Port Norfolk.

—The coach department of the Cincinnati, Hamilton & Dayton Railway shops in Lima was recently destroyed by fire, also the freight car department building, one baggage car, one coach and one sleeper. Loss about $60,000. It is supposed the fire originated from spontaneons combustion.

Bridges.

—Bids are being received for the building of an iron and steel bridge cross the Condoquinet creek at Germeyer Mill, Carlisle, Pa.

—Active work on the railway bridge across the Missouri river at Yankton will soon be commenced, Nearly the entire summer has been taken up by the company in reorganizing, surveying and getting bonds from along the route between Yankton and Norfolk, Neb. The elections were carried in Pierce, Madison and Holt counties. Two of the townships through which the road passes refused to vote bonds, and in retaliation the road refuses to furnish depot accommodations between Crofton and Wasau. A mortgage was filed at Niabrara August 7 by the railway and land syndicate for $1,500,000, two-thirds for the Norfolk & Yankton Railway and the rest for the bridge.

—Plans for the New York tower of the new East River bridge were presented by the engineer, Mr. Buck, at a meeting of the Bridge Commission recently, and it was announced that he had thought it necessary to make several changes in the original plans. The bridge commission has referred the plans to Commissioners Baird and Reeves for investigation and report.

—The Board of Public Works of Denver has rejected all bids for the construction of the proposed new steel bridge over Cherry Creek, on Lawrence street. New bids will be advertised.

—The Woonsocket (R. I.) council took no action on the River street bridge at the meeting August 19 on account of the death of a member of the council. Action will probably be taken September 9 and 14, at which time the different branches meet.

—The Massilon (O.) Bridge Co. has been awarded the contract to construct a hoist bridge at Troy, O.

—The Mercer County Board of Freeholders has awarded a contract to the New Jersey Steel & Iron Co. of Trenton for a new bridge at Highstown, N. Y. It will cost $10,640.

—Drawings and plans for the improvement of the Point bridge at Pittsburgh, Pa., will be soon completed. A new floor of wood and steel will be laid and the towers braced and the entire south end will probably be rebuilt. The end spans will also be strengthened. When the bridge was purchased by the city it was stated that it could be made as good as new at a cost of $100,000.

—The commissioners' court at Hillsboro, Tex., has contracted for the construction of twelve iron and steel bridges throughout the county.

—The Bracket Bridge Co., of Cincinnati, has been awarded the contract for a bridge to be built over the Miami river at Indian Hill for $45,900.

—The Baltimore county (Md.) commissioners have decided to build an iron bridge over George's run which divides the Fifth and Sixth districts. The bridge will have a span of 74 ft., with a width of 16 ft. It has also been decided to build an iron bridge over the mill race at Warren.

Iron and Steel.

—The Union Rolling Mill Co.'s plant at Cleveland, employing 500 hands, has been shut down for an indefinite period. The manager states there is no money in the iron business at present, for the reason that all building operations have been suspended.

—Every mill in the steel department of the Edgar Thomson Works at Braddock has suspended operations. The date of resumption is uncertain. The cause of the suspension could not be officially learned. But seven of the nine blast furnaces at the Carnegie Company's Braddock plant are in blast, and the report has been current this week that six of the seven are to be banked soon.

—The Delaware Iron Co., New Castle, Del., is stated to have received a contract from the Russian government for the machinery for a large tube and pipe mill.

—The Decatur (Ala.) Car Wheel & Manufacturing Co. is adding to its plant, and in the near future will commence the manufacture of all kinds of car wheels. About 200 men are now employed.

—Offers are invited by the government of New South Wales, and will be received by the secretary for public works in Sydney, and the agent-general for New South Wales in London, up to 11:30 o'clock, on the 30th of December, 1896, from persons willing to contract for the supply of 150,000 tons of steel rails and the necessary quantity of fishplates, fishbolts and spikes manufactured in the colony of New South Wales, out of native products. Terms and conditions can be ascertained from the offices of the minister for public works, Sydney (or the agent-general for New South Wales, London).

H. F. J. Porter, Marquette Building, Chicago, representing the Bethlehem Iron Co., has received orders for fluid compressed steel shafts, hollow forged, for some large stern wheel Mississippi river steamboats. These shafts are to be 20 in. in diameter and 40 ft. long.

—One of the largest wheels ever cast in one piece has recently been turned out of the works of Thomas Firth & Sons, Ltd., Sheffield, England. It is of cast steel, and is intended for the rail mill of the Ebbow Vale Steel & Iron Co. It is 12 ft. 6⅜ in. in diameter, 9 in. pitch, 32 in. wide, and weighs, 18½ tons. It has a set of double helical teeth. The whole mass was cast without a hitch. The wheel is the heaviest ever cast in one piece at the Norfolk Works, and ranks among the largest ever cast in the kingdom. Messrs. Firth & Sons are now at work on a wheel of much larger diameter, but not of such great weight, and they are also casting an immense hammer block, which, when completed, will weigh 25 tons.

—George W. McClure & Son, engineers and contractors, Carnegie Building, Pittsburgh, have recently built an additional Mossicks & Crookes hot blast stove, 16 ft. 6 in. in diameter and 75 ft. high, equipped with McClure & Amsler's patent improvements, for the Youngstown Steel Co., Youngstown, Ohio. The other three stoves of this concern will be raised from 57 ft., their present hight, to 75 ft., the contract for which has also been placed with George W. McClure & Son. The same firm is also building a Massicks & Crookes stove for the Red Jacket Furnace of the Shenango Valley Steel Co., New Castle, Pa., which will be 19 ft. 6 in. in diameter and 75 ft. high, and which will also be equipped with McClure & Amsler's patent improvements. They are also building regenerative chambers and underground work and all connections for the new glass tank now being built by the Chambers Glass Co. at Arnold Station on the Allegheny Valley Railway, about 20 miles from Pittsburgh. They have a contrect for an iron draft stack for this concern which will be 6 ft. in diameter and 125 ft. high.

—The Pennsylvania Steel Co. has suspended work at its No. 2 blast furnace owing to the dullness in the iron trade. During its suspension it will be repaired and the transportation of molten metal in ladle cars will be stopped temporarily. There are now but two furnaces in blast in Dauphin county out of nine available for service; one being at Steelton, the other in Harrisburg.

Machinery and Tools.

—The Jeffrey Manufacturing Co., of Columbus, O., has taken up the manufacture of the Robinson patent coal washing machinery. There are many in daily use in this and foreign countries, and it is conceded to be a most efficient and simple washer. Points of special advantage are: Its simplicity, compactness, low cost of installation, low cost of operation, economy in the use of water, and its washing of coal that is not closely sized.

—The Rand Drill Co. has recently received an order from the Michigan Central Railroad Co. for three air compressors for its shops in Detroit, Jackson, Mich., and St. Thomas, Canada. Also an order for two air compressors from the Missouri Car & Foundry Co., St. Louis.

—Thomas Carlin's Sons of Allegheny, has contracted to install the power plant for the Hartley Rose Belting Co., to consist of a Russell engine, Carlin return tubular boilers, Pittsburgh feed water heater, etc.

—It is stated that the Leslie Bros. Manufacturing Co. of Paterson, N. J., manufacturers of the Leslie rotary snow plow, has sold out to the Cooke Locomotive Works of the same place, who will hereafter build and handle these plows.

—As a result of the recent deal of the Murray Iron Works of Burlington, Ia., with the Sioux City Engine & Iron Works, the new shops are about completed at Burlington, and orders from there can be filled by September 1. These shops are being equipped with new and modern machinery, and much larger engines will be turned out than it has been possible for the Sioux City Co. to build. This fact, together with the recognized superiority of the Sioux City Corliss, it is believed, will soon put the business of the Murray Iron Works in Corliss engines in the central and eastern states, in the same enviable position held for some years by the Sioux City Engine & Iron Works, in the Missouri River Valley and western states.

—E. D. Smith & Co. are driving a two mile tunnel for the Metropolitan Water Works of Boston. The tunnel is 11½ x 13½ ft. with four shafts and a portal. No. 1 shaft is 40 ft.; No. 2 shaft is 118 ft.; No. 3 shaft is 111 ft.; No. 4 shaft is 58 ft. deep. They are doing the entire work—drilling, pumping and hoisting, with compressed air. The air is furnished from a plant placed between the portal and shaft No. 4. Air is carried about one-half the distance through an 8 in. pipe, then reduced to 6 in., and afterwards to 4 in. The air is furnished by two duplex Corliss engine air compressors, steam and air cylinders 20 in. diameter by 36 in. stroke, built by the Rand Drill Co., who also furnished 24 slugger drills for the work. No expense has been spared to fit this tunnel up in a first class manner for doing economical and fast work. The results are proving the wisdom of this policy. This concern also have their Niagara Falls work, where they are sinking a wheel pit 280 ft. long, 185 ft. deep, 20 ft. wide for the Niagara Falls Power Co., well under way. The drilling channeling and pumping is done with compressed air furnished by Rand Drill Co. duplex Corliss engine air compressor, 20 in. diameter by 30 in. stroke.

Miscellaneous.

—The Interchangeable Brake Beam Co. has moved its New York office to suite 40, Equitable Building, New York, where a full line of its brake beams will be kept on exhibition.

—One of the most wide awake concerns in the country is the Laidlaw-Dunn-Gordon Co. of Cincinnati, and few excel it in advertising. It has painted on the roof of its factory (which is 665 feet long and close to the C. H. & D. R. R.) in large gold letters 13 feet high, "McKinley Hobart and Protection," and on the other roof "McKinley, Hobart and Sound Money." This shows which side it is on.

—The Vandalia Railroad shops at Effingham, Ill., are to be closed down temporarily. About 100 men will be thrown out of employment.

—The new Baltimore & Ohio machine shops in South Cumberland, Md., have been started up. The making up of trains will be commenced in the new yards, but owing to the rather limited trackage as yet, the transferring of this work from the old yard in Cumberland will be gradual A number of the employes of the road have already settled near the new shops, and the rest will move there as soon and as fast as they can obtain houses. Four years have passed since the company bought the land upon which to erect the yards and shops, and received the endorsement of the city, at a special election, of $150,000 of its bonds to aid in carrying out the scheme. The new buildings are of brick and iron and pretty in design. The round house will accommodate 44 engines, and is 360 feet in circumference.

—The annual meeting of the stockholders of the Westinghouse Air Brake Co. was held on September 1. President Westinghouse stated that the business for the past year had been the most prosperous in the history of the company. The gross business was $5,947,600.57 and the profit $2,607,936.44. The old officers and directors, as follows, were unanimously elected: President, George Westinghouse; vice president, Robert Pitcairn; directors, Geo. Westinghouse, Robert Pitcairn, H. H. Westinghouse, John Cardwell, T. W. Welsh, A. M. Byers and W. W. Card. The board re-elected the old officers.

—The Pittsburgh Reduction Company recently rolled some aluminum plated 94 by 94 in. for the United States government. One of the sheets after rolling was 150x100¼ in., which is said to be the largest sheet of aluminum ever rolled.

—The Reading Railroad has issued orders for the suspension of 10 per cent of their employes in the machine and car shops at Reading, Pa., and along the road. The order went into effect on the 1st inst.

—The Baltimore & Ohio Railroad Co. is rapidly developing its plans for extending its use of electricity. A large coal handling plant is being installed at the power house, and a fifth power generator unit to supply reverse power in case of emergency will be put in. This plant will include an 800 horse power Green tandem compound engine, directly connected to a multipolar 500 kilowatt railway generator.

—The works of the Sterling Emery Wheel Manufacturing Co., Tiffin, O., after having closed down a few days to make necessary repairs on engine, has resumed operations with a full force of workmen.

—The warlike preparations in Japan are causing uneasiness and apprehension in more than one European country. The government has decided to spend many millions of dollars in additions to the army and navy within the next decade. The army is to be raised from 6 to 13 full divisions, more than doubling its strength and possibilities. But the additions to the navy are even more significant. Contracts have been made for the completion by 1902 of 54 men-of-war of different classes, with a combined tonnage of 45,890, and by 1905 of 63 additional vessels whose total tonnage will be 69,895. In other words, by the beginning of 1906, in addition to the present navy, the Mikado will have 117 new war ships at his disposal, making a naval force that will compare favorably with the great ones of Europe. There is a chance here for the armor plate and shipbuilding plants of the United States.

—Some contracts looking to large investments in railroad and industrial interests have lately been made with a provision that they are to be carried out immediately after election if Mr. McKinley wins, but are to be null and void if he is defeated. The Manufacturers' Record learns of one contract of this kind relating to the construction of 300 or 400 miles of railroad in the south.

—At a meeting of the board of directors of the Michigan-Peninsular Car Co., of Detroit, Mich., held August 24, a dividend of 1 per cent on the preferred capital stock was declared, payable September 1.

—The biggest rope ever used for haulage purposes has has just been made for a district subway in Glasgow, Scotland. It is seven miles long, 4⅝ inches in circumference and weighs nearly sixty tons. It has been made in one unjointed and unspliced length of patent crucible steel. When in place it will form a complete circle around Glasgow, crossing the Cylde in its course, and will run at a speed of 15 miles an hour.

—The Colliery Engineer Co. whose quarters in the Coal Exchange building, Scranton, Pa., were destroyed by fire on Aug. 30, notify us that their business is not seriously interfered with thereby. They have secured new quarters in Mears building and are fully ready for business. Their publication office was not located in the burned building and was therefore uninjured.